Nonparametric stability analysis for disease properties of common bunt in wheat

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ABSTRACT INFO

ABSTRACT

Common bunt, also known as stinking smuts or stinking smut, causes a considerable decrease in the yield performance and quality of both winter and spring kinds of wheat. This research aimed to identify the stability properties of resistance to common bunt among 150 wheat genotypes using three measurements, disease severity (DS), coefficient of infection (CI), and infection type (IT). Field trials were conducted in three locations, Maragheh, Kermanshah, and Kurdistan during 2018-2020. Stability analysis was performed via fourteen nonparametric stability statistics. Results showed that genotypes G38 and G63 were the most favorable genotypes based on nonparametric stability statistics as well as high disease resistance according to DS, CI, and IT measurements. The circular dendrograms of DS, CI, and IT, classified wheat genotypes into ten clusters whereas cluster II must be considered based on DS and stability while for simultaneous selection of stable as well as resistant genotypes based on IT, cluster IX following cluster X must be regarded. The simultaneous selection of the most stable, as well as most resistant genotypes based on CI, was not possible. The first factor separated the S3, S6, Fox, and MR as well as DS from the other methods in the plot of factor analysis while in the CI plot, the first factor separated the methods NS1, NS2, and MR from the other methods and in IT, the first factor separates the IT as well as MR and Fox from the other methods and illustrated dynamic stability concept. The Fox and MR methods can be used for stability analysis because they are consistently related to resistance and the dynamic stability concept.

Key words: Coefficient of infection, Disease severity, Dynamic stability, Infection type.

INTRODUCTION

Common bunt of wheat (*Tilletia laevis* Kühn) syn. *T. foetida* (Wallr.) Liro., disease is a very severe problem identified by a broad distribution, powerful epidemic promise, and significant loss (Ren *et al.,* 2021), which the infected crop has no particular symptoms for easy detection. The glumes of infected plants in the late stage of infection, are inclined to spread apart and the ear becomes diseased. The *teliospores* of the pathogen as black powder fill the wheat grains and can produce fishlike smells and cause decreases in quantity and quality of yield (Singh *et al.,* 2016). Common bunt of wheat often happens in Iran, where the pathogen spreads with wheat grains and can survive in the soil for several years. The damage of this disease varies depending on different years, However, an average of 3 to 4 percent is estimated (Mardoukhi *et al.,* 2005) Previous investigations on common bunt of wheat have mostly concentrated on morphological properties, expanding detection methods, studies of the pathogen biological properties, germination specifications, cytological analysis, etc. (Russell and Mills, 1993; Gaudet *et al.,* 2007; Yao *et al.,* 2019).

The investigation of the interaction between wheat host genotype with the environment (G×E) is rarely performed regarding common bunt of wheat while this G×E interaction is important in plant pathology like in other agricultural areas (Madden *et al.,* 2007; Sabaghnia, 2016). Usually, plant breeders grow new genetically improved genotypes in multi-environmental trials (several locations and years) to identify whether or not the environment modifies the value of economic quantitative characters of the host genotypes, such as yield performance, as well as differences among host genotypes regarding the target traits' values. For host wheat genotypes that differ in susceptibility to common bunt pathogen, a G×E interaction could show differences in aggressiveness of the pathogen among test environments (location×year combinations). In such situations, the environment represents the pathogen population, and multi-environmental trials can concentrate on determining characteristics of the host genotypes or the environments (Sabaghnia, 2016). According to Lunzer *et al.* (2023), for the common bunt of wheat, the environment component explained the largest part of the total phenotypic variance, followed by the genotype by environment interaction and the genotypic variance. Like other traits such as yield performance, it seems that for disease resistance, the main sources of variance are environment (about 80%), genotype by environment interaction (about 15%), and genotype main effect (about 5%), while only genotype

by environment interaction and genotype main effect can be analyzed and interpreted (Yan *et al.,* 2000).

According to Dehghani *et al.* (2013), due to the great diversity of host genotypes and environments, it can be difficult to explore host plants by pathogen interaction structures for a special host-pathogen system such as stripe rust of wheat in Iran. El-Naimi *et al.* (2000) reported common bunt of wheat as a major seed and soil-borne disease in West Asia and North Africa. Dariaee *et al.* (2006) reported common bunt of wheat as an important limitation to wheat production in many areas of Iran, especially in traditional agriculture systems. Resistance to common bunt of wheat is an oligo- to polygenic character and it is assumed that there is large variation in disease among test environments. It is interesting to know how the pathogen populations differ in their aggressiveness thus, the stability of resistance in host plant genotypes can be assessed (Madden *et al.,* 2007). Numerous statistical tools have been introduced to assess G×E interaction (Flores *et al.,* 1998; Guach *et al.,* 2008; Sabaghnia, 2012), especially for yield stability in plant breeding. A routine approach is to suppose a normal distribution for the observed dataset and utilize the parametric methods.

An alternative approach for analysis of G×E interaction is nonparametric methods which do not need common assumptions. The nature of the interaction is the change of the ordered ranking of host genotypes within test environments, thus, nonparametric methods are beneficial for exploring interactions (Hühn, 1996). This approach decreases the efficacy of differences in disease evaluation tools among environments and the impression of outliers. Several nonparametric statistics have been proposed for modeling G×E interaction in multi-environmental trials for yield stability analysis (Huehn, 1979; Fox *et al.,* 1990; Thennarasu, 1995; Sabaghnia, 2015; Mohammadi *et al.,* 2023). Very little attention has been paid modeling the interaction effect on various disease characteristics, especially to specify the pathogen population aggressiveness in multi-environmental trials. Most of the nonparametric measures of stability are related to the static concept of stability, while the use of the dynamic concept of stability is recommended, which is highly associated with target traits such as resistance. The nonparametric methods give great flexibility to breeders for simultaneous selection of resistance and stability and to select highly resistant genotypes in a yield stability analysis, it is essential to use the Fox nonparametric measure (Sabaghnia, 2016). This research presents a nonparametric analysis of three important traits

including disease severity (DS), coefficient of infection (CI), and infection type (IT) for wheat genotypes in response to common bunt of wheat (*Tilletia laevis* Kühn) pathogen in multiple environments.

MATERIALS AND METHODS

Trials

Of 150 wheat genotypes including 13 commercial cultivars and 137 advanced breeding lines were obtained from the breeding project of the Dryland Agricultural Research Institute (DARI) of Iran (Supplementary Table 1). The advanced lines were selected among advanced nurseries at different cold dry and sub-tropical dry regions from Uniform Regional Wheat Yield Trials (URWYT). The name and pedigree of genotypes are given in Supplementary Materials. Local samples representing (*Tilletia laevis* Kühn) syn. *T. foetida* (Wallr.) Liro were collected from wheat stubble remaining in the fields of each of three locations, Maragheh, Kermanshah, and Kurdistan during 2018-2020. The seeds of genotypes were artificially inoculated with *teliospores*, thus, a high pressure of disease was created with bunt inoculums. The *Teliospores* were thoroughly dusted on the wheat seeds just before seeding as a weighted ratio of five per thousand and were blended for three minutes for immediate sowing after the rainfall. In all environments, the genotypes were sown in two rows of plots with 1 m long and 0.3 m apart. Plant sampling and recording of healthy and infected heads were rated visually in June and July. The disease severity (DS) was presented as a percentage for bunt disease according to Mamlouk and Van Slageren (1993). The samples up to 5% infected heads were classified as resistant (R=1), more than 5% and less or equal to 10% as moderately resistant (MR=3), 10% and less or equal to 15% as mediate susceptible (MS=5), and infected above 15% as susceptible (S=7). The coefficient of infection (CI) was recorded by multiplying the response value with the intensity of infection in percent while the response value was assumed I=0 (immune), R=0.2 (resistant), MR=0.4 (moderately resistant), M=0.6 (moderate), MS=0.8 (moderately susceptible), and S=1 (susceptible) as a modified method of Aujla *et al.* (1989). Infection type (IT) was assessed 12 days after inoculation, according to a 0-9 scale; 1=highly susceptible (HS), 3=susceptible (S), 5=intermediate resistant (I); 7=resistant (R); 9=highly resistant (HR) (McNeal *et al.,* 1971).

Stability analysis

Huehn (1979) proposed six nonparametric statistics as:

$$(1) \quad S_i^{(1)} = 2 \sum_{j}^{n-1} \sum_{j'=j+1}^{n} |r_{ij} - r_{ij'}| /[n(n-1)]$$

$$(2) \quad S_i^{(2)} = \sum_{j=1}^{n} (r_{ij} - \bar{r}_{i.})^2 /(n-1)$$

$$(3) \quad S_i^{(3)} = \frac{\sum_{j=1}^{n}(r_{ij} - \bar{r}_{i.})^2}{\bar{r}_{i.}}$$

$$(4) \quad S_i^{(4)} = \sqrt{\frac{\sum_{j=1}^{n}(r_{ij} - \bar{r}_{i.})^2}{n}}$$

$$(5) \quad S_i^{(5)} = \frac{\sum_{j=1}^{n} |r_{ij} - \bar{r}_{i.}|}{n}$$

$$(6) \quad S_i^{(6)} = \frac{\sum_{j=1}^{n} |r_{ij} - \bar{r}_{i.}|}{\bar{r}_{i.}}$$

For a two-way layout with k genotypes and n environments, we denote the value of the ith genotype in the jth environment as x_{ij}, where $i=1,2,...,k$, $j=1,2,...,n$, r_{ij} as the rank of the ith genotype in the jth environment, and $\bar{r}_{i.}$ as the overall mean rank for the ith genotype. Fox *et al.* (1990) introduced another nonparametric method using stratified ranking of the genotypes whereas ranking was performed for environments individually and the number of environments at which the genotype presented in the top, middle, and bottom third of the ranks was calculated; and a genotype that presented mostly in the top third was supposed as the most stable genotype. Thennarasu (1995) introduced five nonparametric statistics based on adjusted phenotypic values ($x_{ij}^* = x_{ij} - \overline{x_{i.}}$):

$$(7) \quad NP_i^{(1)} = \frac{1}{n} \sum_{J=1}^{n} |r^*_{ij} - M^*_{di}|$$

$$(8) \quad NP_i^{(2)} = \frac{1}{n} \left[\sum_{J=1}^{n} |r^*_{ij} - M^*_{di}| /M_{di} \right]$$

$$(9) \quad NP_i^{(3)} = \frac{\sqrt{\sum(r^*_{ij} - \overline{r^*}_{i.})^2 /n}}{\overline{r}_{i.}}$$

$$(10) \quad NP_i^{(4)} = \frac{2}{n(n-1)} \left[\sum_{j=1}^{n-1} \sum_{[j'=j+1]}^{n} |r^*_{ij} - r^*_{ij'}| /\overline{r}_{i.} \right]$$

Where r^*_{ij} is the rank of the adjusted value of the ith genotype in the jth environment, $\overline{r_{i.}^*}$ is the overall

mean rank for the adjusted value of the *i*th genotype, M_{di} is the median of ranks for the *i*th genotype, and M^*_{di} is the median of ranks for the adjusted values of the *i*th genotype. The two nonparametric stability statistics, NS1 and NS2 (Sabaghnia, 2015) were computed using below formulas:

$$(11) \quad NS_i^{(1)} = (Q_3 - Q_1)/M_{di}$$

$$(12) \quad NS_i^{(2)} = (D_9 - D_1)/M_{di}$$

Where $Q_3 - Q_1$ is the inter-quartile range and $D_9 - D_1$ is the inter-decile range as the nonparametric indices of dispersion. These nonparametric statistics have been described in detail by Sabaghnia (2016). All of the above stability statistics were calculated via a spreadsheet program of Microsoft Excel software.

RESULTS

Regarding thirteen nonparametric statistics, mean rank, and the disease severity (DS), genotypes G38 and G67 the highest disease resistance capacity and stability (Supplementary Table 2). Some stable genotypes like G19, G28, G68, G118, and G123 had moderate disease resistance while some others like G70 and G84 showed low disease resistance based on the DS scale. In the coefficient of infection (CI), genotypes G7, G38, and G63 were the best genotypes from both disease resistance properties and stability performance according to nonparametric statistics, mean rank, and CI (Supplementary Table 3). Some of the most stable genotypes like G95 had moderate disease resistance while others like G70 indicated low disease resistance based on the CI scale. Considering nonparametric statistics, mean rank, and the infection type (IT), genotypes G34, G37, G52, G63, G65, and G149 were the best genotypes from both disease resistance capacity and stability potential (Supplementary Table 4). Some stable genotypes like G30 and G147 had moderate disease resistance while some others like G78 showed low disease resistance based on the IT scale. Thus, it can be concluded that genotypes G38 and G63 were the most stable genotypes based on nonparametric stability statistics with a high disease resistance according to DS, CI, and IT measurements.

For a better understanding of genotypes' grouping, cluster analysis was performed based on squared Euclidean distance and Ward clustering method. Because of the large number of genotypes, a circular dendrogram was employed instead of common horizontal or vertical dendrograms, and the number of clusters was determined through some multivariate statistics. According to the circular dendrogram of DS (Figure 1), wheat genotypes were classified into ten clusters whereas genotypes of clusters II and III were the most stable ones, genotypes of clusters I, IV, VII, and X were the moderate stable, and genotypes of clusters V, VI, VIII and X were the most unstable genotypes. All of the multivariate statistics, Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root, indicated significant differences among clusters (Table 1). Regarding disease severity (DS), genotypes of clusters II, VII, and IX were the most resistant genotypes, while genotypes of clusters I, IV, VII, and X were moderately resistant , and genotypes of clusters V, VI, VIII, and IX were the most susceptible genotypes. Thus, for simultaneous selection of the most stable as well as the most resistant genotypes based on DS, genotypes of cluster II must be considered. Also, genotypes of clusters III and VII had moderate situations based on stability and disease resistance. For recommendation, genotypes of cluster II (G7, G24, G93, G95, G115, G116, and G121) following some genotypes of clusters III and VII (38, 67, 68, 102, 61, 92, 101, 136, 140, 146, 150) could be considered according to IT and stability of resistance.

Based on the circular dendrogram of CI (Figure 2), 150 genotypes were grouped into ten different clusters whereas genotypes of clusters III, IV, VI, and VII were the most stable genotypes while, genotypes of clusters I, V, VI, and VII were the moderate stable genotypes, and genotypes of clusters II, IX and X were the most unstable genotypes. The statistics of multivariate ANOVA showed significant differences among these ten clusters (Table 1). Regarding the coefficient of infection (CI), genotypes of clusters I and II were the most resistant genotypes, genotypes of clusters III, IV, and X were the moderate resistant genotypes, and genotypes of clusters V, VI, VII, VIII, and IX were the most susceptible genotypes. The simultaneous selection of the most stable as well as most resistant genotypes is not possible, but genotypes of clusters I, III, and IV can be considered in moderate mood. For recommendation, genotypes G4, G7, G38, G63, and G125 followed by G64, G95, G109, G115, and G121 could be considered according to IT and stability of resistance.

According to the circular dendrogram of IT (Figure 3), 150 wheat genotypes were classified into ten different clusters whereas genotypes of clusters III, IX, and X were the most stable genotypes, genotypes of clusters IV, V, VI and VII were the moderate stable genotypes, and genotypes of clusters I, II and VIII
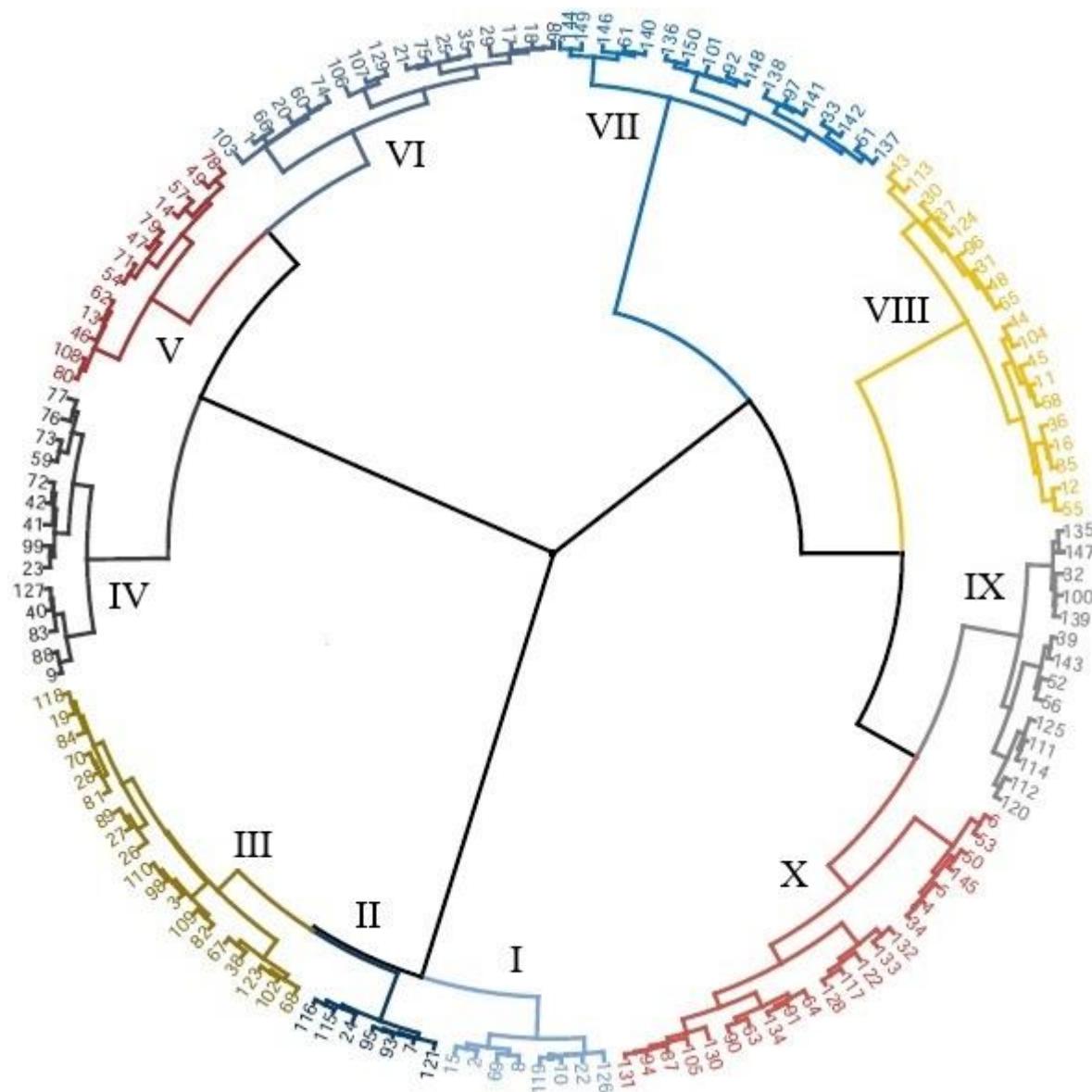
Figure 1. Circular dendrogram of wheat genotypes for disease severity (DS), based on squared Euclidean distance and Ward clustering method.

Table 1. Statistics of multivariate ANOVA for determining cutoff point of dendrograms.

Multivariate values	Degrees of freedom		DS		CI		IT	
	Hypothesis	Error	Value	F	Value	F	Value	F
Pillai's trace	135	1206.0	4.3	8.1**	4.1	7.5**	4.5	9.0**
Wilks' lambda	135	995.5	0.0	14.7**	0.0	12.4**	0.0	14.9**
Hotelling's trace	135	1118.0	27.7	25.5**	20.7	19.0**	24.6	22.7**
Roy's largest root	15	134.0	12.9	115.0**	9.7	86.5**	10.0	89.7**

were the most unstable genotypes. Four multivariate statistics of multivariate ANOVA, Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root, showed significant differences among these ten clusters

(Table 1). Regarding infection type (IT), genotypes of clusters VII, VIII, IX, and X were the most resistant genotypes, genotypes of clusters I, II, and III were the moderate resistant genotypes, and genotypes of clusters
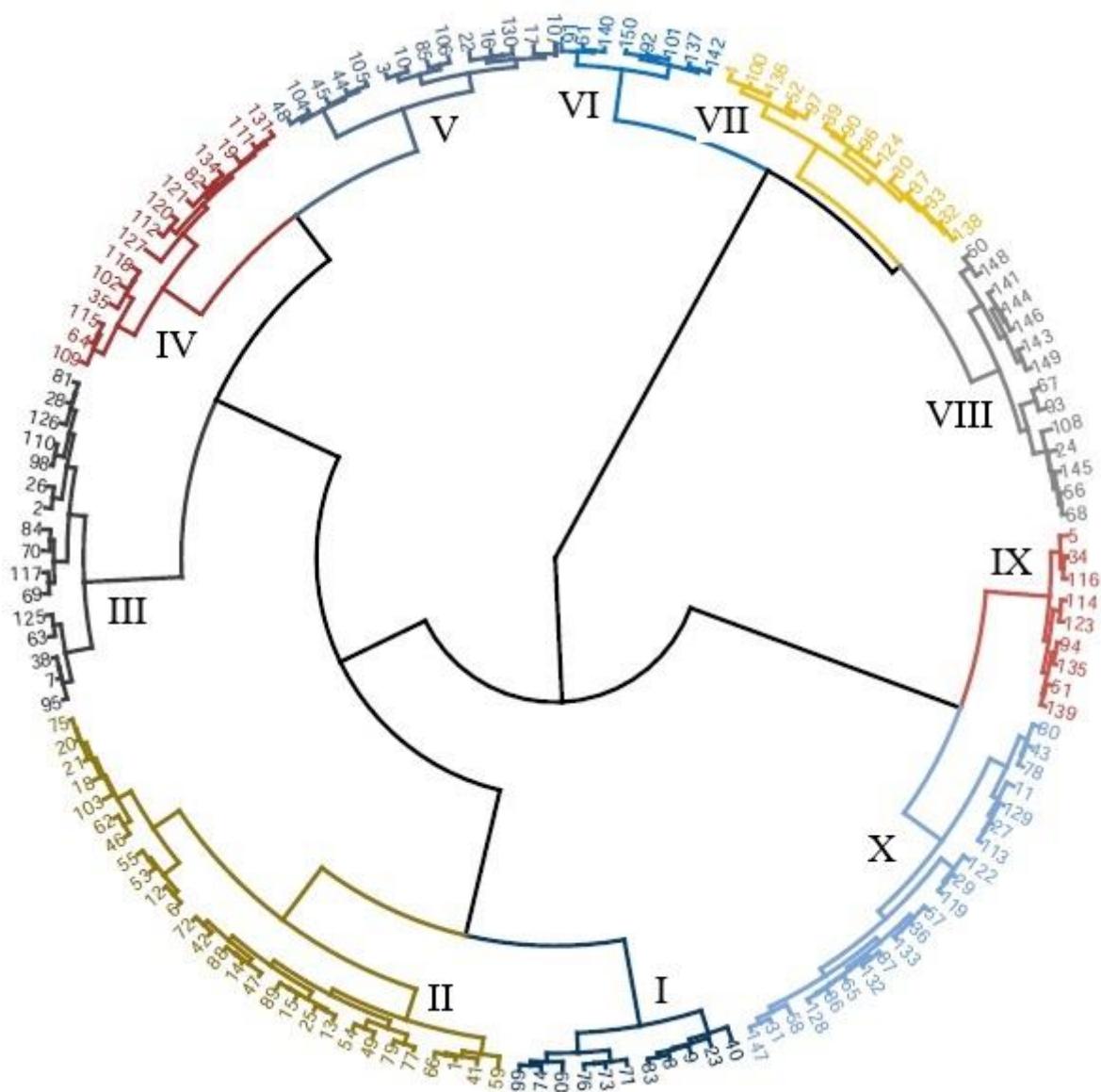
Figure 2. Circular dendrogram of wheat genotypes for coefficient of infection (CI), based on squared Euclidean distance and Ward clustering method.

IV, V, and VI were the most susceptible genotypes. Thus, for the simultaneous selection of stable as well as resistant genotypes based on IT, genotypes of cluster IX following cluster X must be considered. Also, genotypes of clusters III and VII had moderate situations based on stability and disease resistance. For recommendation, genotypes G2, G8, G15, G26, G72, G77, G83, and G88 could be considered according to IT and stability of resistance. In general, the results of the disease severity (DS) and the coefficient of infection (CI) relatively verified each other while the results of the infection type (IT) were relatively different from the two previous measurements. However, genotypes G4 and G115 were selected based on DS and CI as well as most of the nonparametric stability statistics.

Figure 4 shows that the first factor separates the methods S3, S6, Fox, and MR as well as DS from the other methods. Sabaghnia (2016) reported that the S6 and Fox are related to the dynamic concept of stability. The righthand methods of Figure 4 are similar in concept to host genotype by environment interaction measures as they define stability in the sense of homeostasis, thus, the first factor separates the methods into two main groups according to the two famous stability concepts: show on the right methods corresponding to the static concept and on the left the methods based on the dynamic concept of stability. The second factor separates MR from the left methods of Figure 4. Figure 5 indicates that the first factor separates the methods NS1, NS2, and
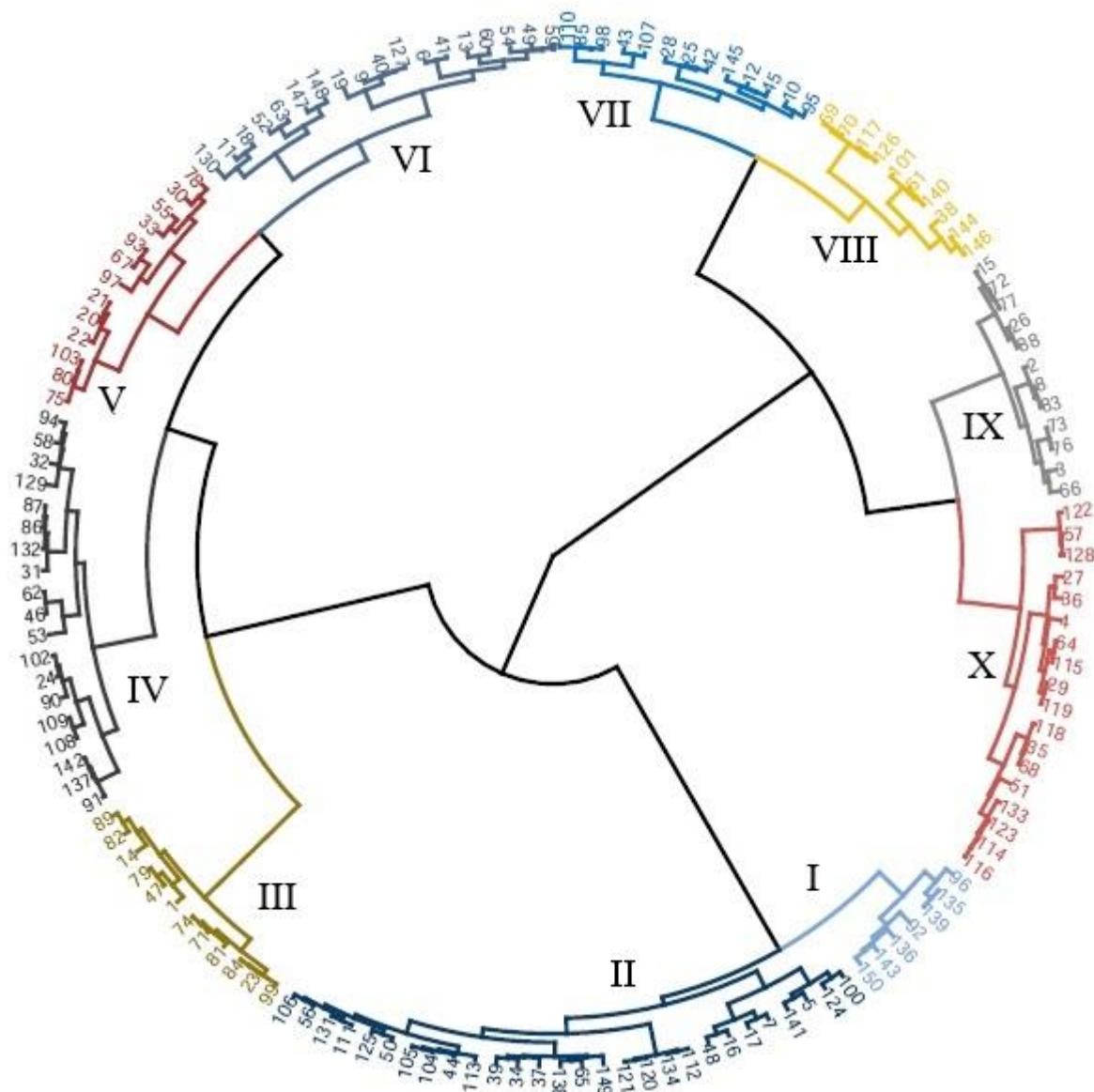
Figure 3. Circular dendrogram of wheat genotypes for infection type (IT), based on squared Euclidean distance and Ward clustering method.

MR from the other methods and the second factor separates CI as well as S3, S6, and Fox from the right bottom methods. Figure 6 shows that the first factor separates the IT as well as MR and Fox from the other methods and illustrates the dynamic stability concept.

DISCUSSION

Resistance to common bunt in wheat is one of the most important goals in plant breeding projects in most wheat-producing areas of the world and pure lines from diverse parental genotypes are a good potential source of common bunt resistance for developing new resistant cultivars. A large number of wheat advanced lines have been preserved in Iran, which possessed

abundant genetic diversity including common bunt, thus, it is of great importance to identify resistance genetic resources to be explored in genetic improvement projects aiming to develop improved resistant cultivars. In this research, a circular dendrogram was used due to the large number of wheat genotypes for grouping based on fourteen nonparametric stability statistics and three common bunt disease measurements, disease severity (DS), coefficient of infection (CI), and infection type (IT). The results of DS and CI were relatively similar and recommended some genotypes, especially genotypes G4 and G115, as the most stable as well as most resistant genotypes. Sabaghnia (2016), reported relatively similar results for DS and CI. The results of IT were different from the other measures
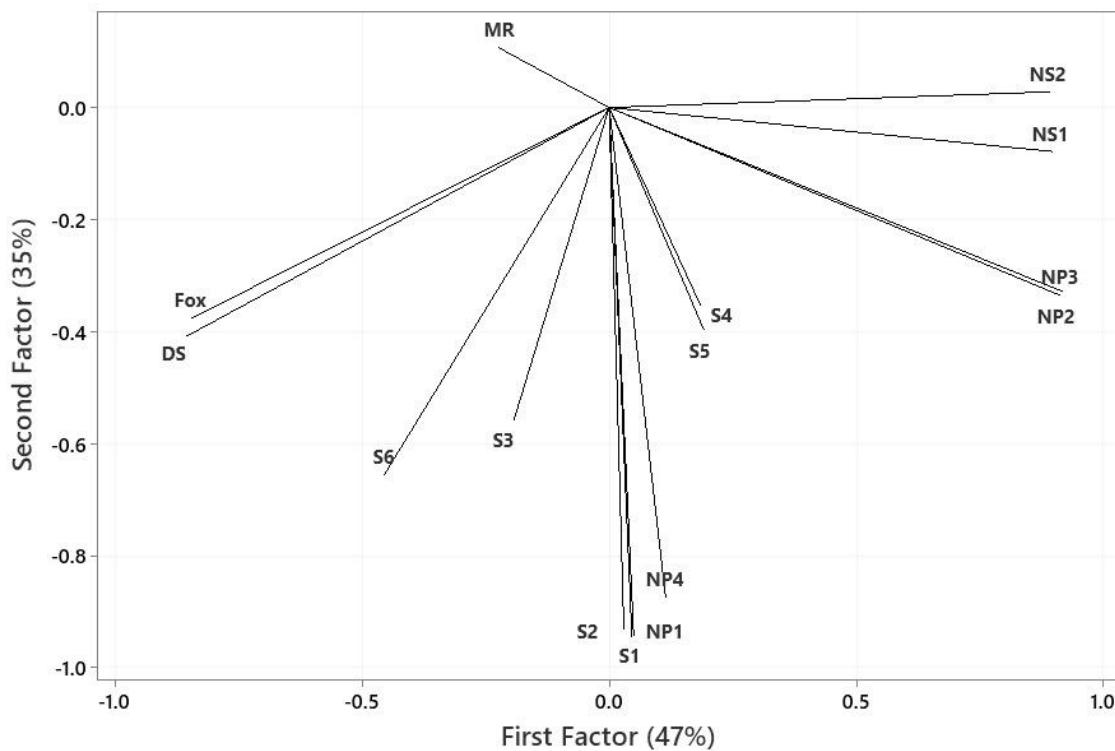
Figure 4. Factor analysis plot of ranks of stability of disease severity (DS), estimated by fourteen nonparametric methods for wheat genotypes grown in six environments and showing interrelationships among measurements.
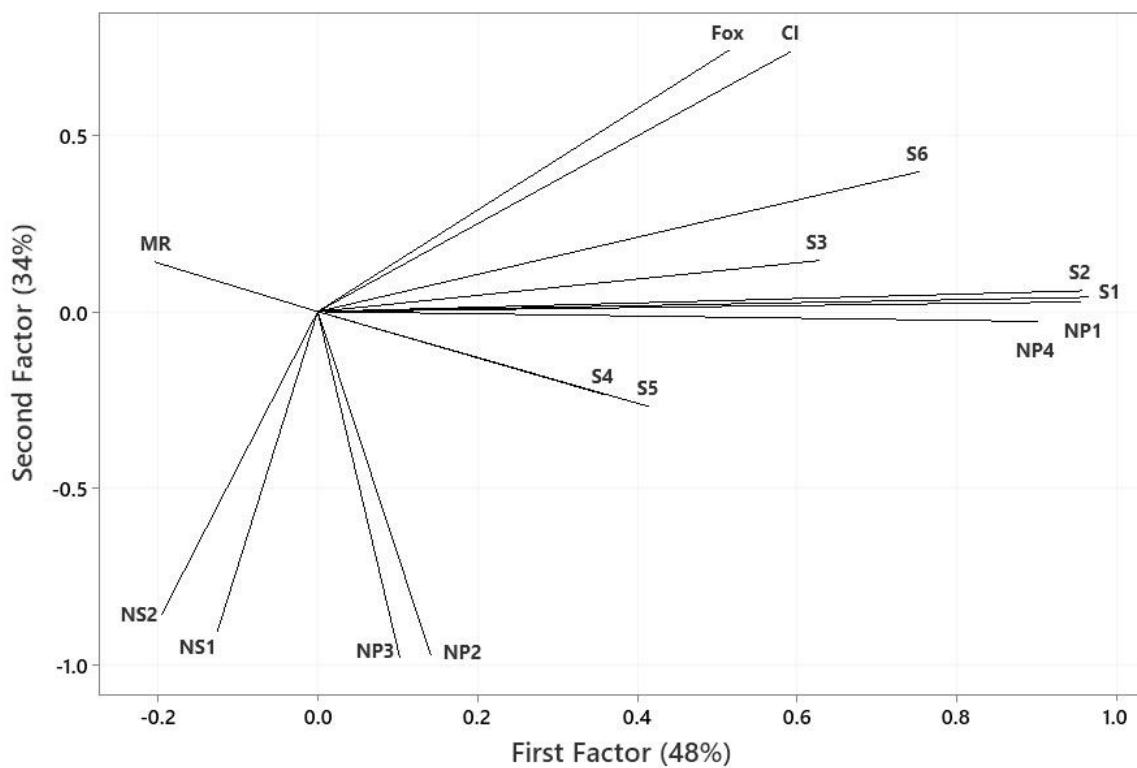
Figure 5. Factor analysis plot of ranks of stability of coefficient of infection (CI), estimated by fourteen nonparametric methods for wheat genotypes grown in six environments and showing interrelationships among measurements.
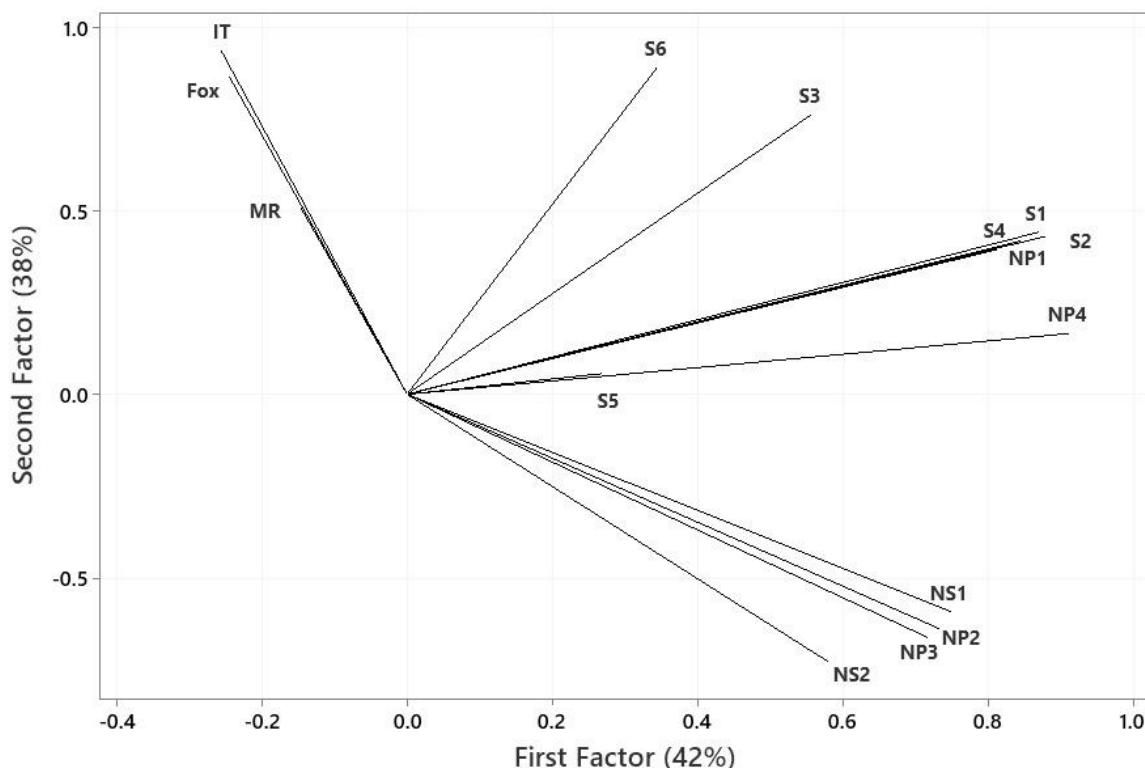
Figure 6. Factor analysis plot of ranks of stability of infection type (IT), estimated by fourteen nonparametric methods for wheat genotypes grown in six environments and showing interrelationships among measurements.

and identified genotypes G8, G15, G26, G72, G77, G83, and G88 as the most stable as well as most resistant genotypes. Slowing common bunt disease like rust could be explored via various indices such as the coefficient of infection (CI) (Pathan and Park 2007), and some researchers consider CI as the common index for assessment of common bunt reaction. We found a relatively high association between CI and infection type (IT), as a nonparametric measure, and both of them had a high relation with the mean rank (MR) stability measure. The nonparametric stability measure of Fox *et al.* (1990) showed a high positive correlation with all studied indices (DS, CI, and IT) and reflecting the dynamic concept, introduced highly resistant genotypes as the most stable ones. Such dynamic property of the Fox *et al.* (1990) method has been reported by Sabaghnia (2016) in the severity of gray leaf spots of maize. Most breeders prefer simultaneous selection for disease and stability because the selected genotypes must have high resistance coupled with stability (Flores *et al.*, 1998; Madden *et al.*, 2007; Sabaghnia, 2016).

Our results show that it is possible to find sources of resistance to common bunt disease, among studied wheat genotypes, and such finding was reported by other researchers (Akcura and Akan 2018; Madenova

et al., 2021). Due to the suitable climatic conditions for the spread of common bunt in Iran, despite spending a lot of costs on seed disinfection, this disease causes a lot of damage in wheat fields every year, and most of the harvested wheat is infected with different degrees. Considering the lowering of the contamination standard of wheat for human consumption and efforts to reduce the consumption of toxins to prevent environmental pollution, it is necessary to evaluate commercial cultivars and determine resistance genes in different regions to establish and implement methods by natural and low-risk control management of the disease. However, generally genotypes G38 and G63 were introduced as resistance materials based on studied tools (DS, CI, and IT) ignoring their stability characteristics. Although, the environment describes more than 80% of the observed variation, only the genotype and its interaction with the environment can be discussed, so the superiority of these genotypes (G38 and G63), can be referred to their genetic properties.

The results of our research confirmed the effectiveness of these wheat genotypes for resistance or tolerancing to the common bunt pathogen, whereas such ability has been reported by other researchers in the world (Al-Maaroof *et al.,* 2016), which allows encouraging their implementation in the breeding

program as parents for crossing with high yield susceptible cultivars. To provide sources of resistance and breed high-yielding and resistant cultivars, it is necessary to cooperate with countries like India and the Czech Republic and international institutions like ICARDA and CIMMYT that have succeeded in the field resistance and use their genotypes to improve high-yielding and commercial cultivars. Also, it is necessary to control the pathogenicity changes of the fungus causing the disease in different regions due to the possibility of the emergence of new races causing the disease and breaking the resistance of the cultivated cultivars. Considering the severe contamination that has occurred on some sensitive genotypes and the difference in the contamination level of cultivars whose response to the disease is the result of the presence or absence of resistance genes, among these genotypes and even different clusters, it is clear that there are very good sources of resistance among these genotypes.

CONCLUSION

The common bunt infection was found to show different impacts on wheat genotypes and a considerable number of resistant genotypes are available in disease condition. Genotypes G38 and G63 can be considered valuable resistance sources to common bunt according to DS, CI, and IT measurements without considering stability issues. Identified resistance genotypes will be useful for breeding programs to form resistance cultivars to common bunt in Iran. The results of the DS and the CI relatively verified each other while the results of the IT were relatively different. However, genotypes G4 and G115 were selected based on DS and CI as well as most of the nonparametric stability statistics.

ACKNOWLEDGMENTS

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SUPPLEMENTAL DATA

Supplementary Table 1. Pedigree of rainfed wheat genotypes used in this study.

No.		
1	RAN/NE701136//CI13449/CTK/3/CUPE/4/SXL/VEE/5/1D13.1/MLT//TRK13/3/PKL70/LIRA/6/5299	IRW08-540-0Mar-0Mar
2	37025 Turkey/Sabalan//AKSEL	IRW08-291-0Mar-0Mar
3	RAN/NE701136//CI13449/CTK/3/CUPE/4/SXL/VEE/5/1D13.1/MLT//TRK13/3/PKL70/LIRA/6/5299	IRW08-540-0Mar-0Mar
4	Altay/3/PTZ NISKA/UT1556-170//UNKNOWNT	IRW08-076-0Mar-0Mar
5	Sabalan//Fenkang/Sefid	IRW08-102-0Mar-0Mar
6	Fgs/KATIA1	IRW08-222-0Mar-0Mar
7	Fgs/Azar-2	IRW08-220-0Mar-0Mar
8	VORONA/HD24-12//GUN/3/Tam 200/Kauz	IRW08-598-0Mar-0Mar
9	Dari-4/5/Cbc//No/Inia/3/Lfd/4/….6/ERYT5678-F134.71/NAC//ZOMBOR	IRW08-643-0Mar-0Mar
10	Fenkang/Sefid/6/RAN/NE701136//CI13449/CTK/3/CUPE/4/SXL/VEE/5/1D13.1/MLT//TRK13/3/PKL70/LIRA	IRW08-250-0Mar-0Mar
11	Fenkang/Sefid/6/RAN/NE701136//CI13449/CTK/3/CUPE/4/SXL/VEE/5/1D13.1/MLT//TRK13/3/PKL70/LIRA	IRW08-250-0Mar-0Mar
12	WESTON/VEE/6/RAN/NE701136//CI13449/CTK/3/CUPE/4/SXL/VEE/5/1D13.1/MLT//TRK13/3/PKL70/LIRA	IRW08-323-0Mar-0Mar
13	ICAMOR-TA04-68//SHARK/F4105W2.1	IRW08-353-0Mar-0Mar
14	RAN/NE701136//CI13449/CTK/3/CUPE/4/SXL/VEE/5/1D13.1/MLT//TRK13/3/PKL70/LIRA/6/Bayrak tar	IRW08-538-0Mar-0Mar
15	PAVON DWARF/Azar-2	IRW08-151-0Mar-0Mar
16	Sardari/Azar-2	IRW08-133-0Mar-0Mar
17	100 ZHONG 257//CNO79/PRL/3/OK82282//BOW/NKTT/6/RAN/ NE701136//CI13449/CTK/3/CUPE/4/SXL/VEE/5/1D13.1/MLT//TRK13/3/PKL70/LIRA	IRW08-335-0Mar-0Mar
18	Trakia//Maga"s"74/Mon"s"/3/Shahi/4/91-142 a 61/3/F35.70/MO73//1D13.1/MLT	IRW08-232-0Mar-0Mar
19	Bayrak tar/4/DONSKAYA POLUKARLIKOVAYA/OLVIA /3/2*AGRI/BJY//VEE	IRW08-126-0Mar-0Mar
20	G.B	
21	G.B	

Supplementary Table 1 (Continued).

No.	
22	Vee/Nac//SARA-BW-F6-06-85-86-2-5　IRW2009-10-048-0MA-0MA-0MA-0MA-0MA-1MA
23	Vee/Nac//Gahar　IRW2009-10-050-0MA-0MA-0MA-0MA-0MA-6MA
24	Maroon/3/Sardari//Ska/Aurifen　IRW2009-10-003-0MA-0MA-0MA-0MA-0MA-3MA
25	Maroon/3/Sardari//Ska/Aurifen　IRW2009-10-003-0MA-0MA-0MA-0MA-0MA-4MA
26	Maroon/Gahar　IRW2009-10-006-0MA-0MA-0MA-0MA-0MA-5MA
27	Debira/7/Zcl/3/Pgfn//Cno67/Son64(Es86-8)/4/Kauz/5/Trk13/6/F134.71/Nac//Sabalan　IRW2009-10-007-0MA-0MA-0MA-0MA-0MA-4MA
28	Dharwar Dry/Nesser/3/F130-L-1-12//PONY/OPATA　IRW2009-10-013-0MA-0MA-0MA-0MA-0MA-3MA
29	Dharwar Dry/Nesser//SARA-BW-F6-06-85-86-2-5　IRW2009-10-056-0MA-0MA-0MA-0MA-0MA-6MA
30	Arvand//78Zhong291/Azar2　IRW2009-10-058-0MA-0MA-0MA-0MA-0MA-4MA
31	Chenab/GB-SARA-27　IRW2009-10-023-0MA-0MA-0MA-0MA-0MA-6MA
32	Chenab/GB-SARA-27　IRW2009-10-023-0MA-0MA-0MA-0MA-0MA-7MA
33	Chenab//78Zhong291/Azar2　IRW2009-10-061-0MA-0MA-0MA-0MA-0MA-6MA
34	Wang shui bai//78Zhong291/Azar2　IRW2009-10-070-0MA-0MA-0MA-0MA-0MA-4MA
35	Sorkhtokhm/Desconciod-7　IRW2009-10-112-0MA-0MA-0MA-0MA-0MA-8MA
36	Kavir//78Zhong291/Azar2　IRW2009-10-087-0MA-0MA-0MA-0MA-0MA-2MA
37	Kavir//78Zhong291/Azar2　IRW2009-10-087-0MA-0MA-0MA-0MA-0MA-4MA
38	Systani/6/Sbn//Trm/K253/5/Anza/3/Pi//Nor/Hys/4/Sefid　IRW2009-10-134-0MA-0MA-0MA-0MA-0MA-4MA
39	K5-0MA-0MA-0MA-0MA-0MA-4MA
40	K50-0MA-0MA-0MA-0MA-0MA-2MA
41	K50-0MA-0MA-0MA-0MA-0MA-3MA
42	K50-0MA-0MA-0MA-0MA-0MA-4MA
43	Arvand//78Zhong291/Azar2　IRW2009-10-058-0MA-0MA-0MA-0MA-0MA-4MA
44	HGO94.9.1.37/2*NAVJ07
45	ATTILA/2*PASTOR//YUMAI 29
46	KARL/NIOBRARA//TAM200/KAUZ/3/TAM200/KAUZ
47	Mahooti/6/Vee"s"/Pvn"s"/4/Cc//Cal/Sr/3/Kal/Bb/5/Sabalan　IRW2009-10-115-0MA-0MA-0MA-0MA-0MA
48	Systani/Sar-101　IRW2009-10-131-0MA-0MA-0MA-0MA-0MA
49	Bocro-4/Shahi(Ir64…Ste//Weebill1　IRW2009-10-142-0MA-0MA-0MA-0MA-0MA
50	Systani/3/KS82W409/SPN//TAM106/TX78V3630　IRW2009-10-143-0MA-0MA-0MA-0MA-0MA
51	Azar-2/14- Gen Bank　IRW2009-10-171-0MA-0MA-0MA-0MA-0MA
52	Manning/Sdv1//Dogu88/3/GB1- 254　IRW2009-10-184-0MA-0MA-0MA-0MA-0MA
53	F130-L-1-12//PONY/OPATA/3/Kharchia　IRW2009-10-217-0MA-0MA-0MA-0MA-0MA
54	F130-L-1-12//PONY/OPATA/3/Kharchia　IRW2009-10-217-0MA-0MA-0MA-0MA-0MA
55	Shahi/Prl"S"//Fenkang15/Sefid/3/316 Collection　IRW2009-10-230-0MA-0MA-0MA-0MA-0MA
56	Koohdasht/Rasad　IRW2009-10-249-0MA-0MA-0MA-0MA-0MA
57	Koohdasht/Wang shui bai　IRW2009-10-251-0MA-0MA-0MA-0MA-0MA
58	Int F5 2014-44-0MA-1MA
59	Int F5 2014-54-0MA-1MA
60	Int F5 2014-70-0MA-3MA
61	Int F5 2014-78-0MA-1MA
62	MK 3744/BWKLDN-95 (23FAWWON)
63	ID2619/5/GRTPL 6121/6/ID3910066/7/SHARK/F4105W2.1 (23FAWWON)
64	TX71A983.4/TX69D4812//PYN/3/VPM/MOS83.11.4.8//PEW/4/NS-55-25 (23FAWWON)
65	DAGDAS/APCB-40 (23FAWWON)
66	Mahooti/6/Vee"s"/Pvn"s"/4/Cc//Cal/Sr/3/Kal/Bb/5/Sabalan　IRW2009-10-115-0MA-0MA-0MA-0MA-0MA
67	Maroon/Gahar　IRW2009-10-006-0MAR-00SAR-0SAR-0SAR-0SAR-1SAR
68	Systani/Sar-101　IRW2009-10-131--0MAR-00SAR-0SAR-0SAR-0SAR-2SAR
69	Bocro-4/Shahi(Ir64…Ste//Weebill1　IRW2009-10-142-0Mar- -0MAR-00SAR-0SAR-0SAR-0SAR-2SAR
70	SN64//SKE/2*ANE/3/SX/4/BEZ/5/SERI/6/VORONA/HD2402/7/F10S-1/8/Rsk/Nac/Sardari/5/Lr64/Iz1813//093-4413/No57/4/Sul66/6/Cno67/Mfd//Mon"s"/3/Seri/4/Shahi /7/Desconciod-7　IRW2009-10-204--0MAR-00SAR-0SAR-0SAR-0SAR-2SAR
71	SN64//SKE/2*ANE/3/SX/4/BEZ/5/SERI/6/VORONA/HD2402/7/F10S-1/8/Rsk/Nac/Sardari/5/Lr64/Iz1813//093-4413/No57/4/Sul66/6/Cno67/Mfd//Mon"s"/3/Seri/4/Shahi /7/Desconciod-7　IRW2009-10-204-0Mar-0SAR-0SAR
72	SN64//SKE/2*ANE/3/SX/4/BEZ/5/SERI/6/VORONA/HD2402/7/F10S-1/8/Rsk/Nac/Sardari/5/Lr64/Iz1813//093-4413/No57/4/Sul66/6/Cno67/Mfd//Mon"s"/3/Seri/4/Shahi /7/Desconciod-7　IRW2009-10-204--0MAR-00SAR-0SAR-0SAR-0SAR-6SAR

Supplementary Table 1 (Continued).

No.	
73	SARDARI-HD83//LINFEN875072/KAUZ/4/92 ZHONG 257//CNO79/PRL/3/ OK82282/ /BOW/NKTT IRW2009-10-214--0MAR-00SAR-0SAR-0SAR-0SAR-1SAR
74	SARDARI-HD83//LINFEN875072/KAUZ/4/92 ZHONG 257//CNO79/PRL/3/ OK82282/ /BOW/NKTT IRW2009-10-214--0MAR-00SAR-0SAR-0SAR-0SAR-1SAR
75	BITOP/MUFITBEY
76	ZUSTRICH/SELYANKA
77	KROSHKA/4/VORONA//MILAN/SHA7/3/MV17
78	JI5418/MARAS/4/1D13.1/MLT/3/LFN/SDY//PVN/5/GALLYA-ARAL1
79	BONITO-37//PYN/2*BAU
80	CITARI-9/MV18-2000//STARSHINA
81	FULLER/OVERLEY//KS980554-12-~9
82	KS020446TM~2/KS020469TM~1//KAJAGGER
83	CO050337-2/BYRD
84	55.1744/7C//SU/RDL/3/CROW/4/VS73.600/MRL/3/BOW//YR/TRF/5/BLOYKA /6/ZARGANA-3
85	ERYT783-96/SHARK-1 TCI-001409030YE-030YE-2E-0E-5AP-0AP
86	QUAIU//MILLENNIUM/NE93613
87	KUPAVA/7/AU/3/MINN//HK/38MA/4/YMH/ERA/5/PMF//CNO/GLL/6/KAUZ//ALTAR 84/AOS/8/DEMIR
88	ZCL/3/PGFN//CNO67/SN64/4/SERI/5/UA.2837/6/ATTILA/3*BCN/7/ZARGANA-6
89	BONITO-37/MV10-2000/3/SHI#4414/CROWS"//GKSAGVARI/CA8055
90	Sardari
91	Azar2
92	Homa
93	Baran
94	Sadra
95	Hashtrood
96	Ohadi
97	Rasad
98	Varan
99	Rijaw
100	Prav
101	Tak.ab
102	Saein
103	AFTAB
104	BABAX/LR42//BABAX*2/3/KUKUNA/4/BACEU #1/5/BECARDCMSS07Y00885T-099TOPM-099Y-099M-099Y-10M-0RGY
105	BABAX/LR42//BABAX*2/3/KUKUNA/4/CROSBILL #1/5/BECARDCMSS 07Y01006 T- 099TOPM-099Y-099M-099NJ-099NJ-7RGY-0B
106	BABAX/LR42//BABAX*2/3/KUKUNA/4/CROSBILL #1/5/BECARD
107	BLOUK #1/5/FRET2*2/4/SNI/TRAP#1/3/ KAUZ*2/ TRAP//KAUZCMSS06B01047T-099TOPY-099Y-11M-0Y-5B-0Y
108	KIRITATI//PRL/2*PASTOR/5/OASIS/SKAUZ//4*BCN/3/PASTOR/4/KAUZ*2/YACO//KAUZ/6/KIRITATI//PRL/2*PASTORCMSS 07Y00718T-099TOPM-099Y-099M-099Y-22M-0RGY
109	BAJ #1/3/KIRITATI//ATTILA*2/PASTOR CMSS07Y 00288S-0B-099Y-099M-099NJ-099NJ-10WGY-0B
110	WBLL1*2/VIVITSI//MESIA/3/KIRITATI/WBLL1CMSS07Y00841T-099TOPM-099Y-099M-099Y-12M-0WGY
111	SUP152/BAJ #1CMSS08Y00185S-099Y-099M-099NJ-099NJ-28WGY-0B
112	MUNAL*2/WESTONIACMSS08Y00871T-099TOPM-099Y-099M-099NJ-099NJ-66WGY-0B
113	CHEWINK #1/MUTUSCMSS08Y00485S-099Y-099M-099Y-5M-0WGY
114	MUNAL*2/WESTONIACMSS08Y00833T-099TOPM-099Y-099M-099NJ-099NJ-8WGY-0B
115	BABAX/LR42//BABAX*2/3/PAVON 7S3, +LR47/4/ND643/2*WBLL1 /5/BABAX /LR42// BABAX*2/3/PAVON 7S3, +LR47CMSS08 B00 634T -099TOPY-099M-099NJ-099NJ-24WGY-0B
116	QUAIU #1/5/KIRITATI/4/2*SERI.1B*2/3/ KAUZ*2/ BOW//KAUZ/6/ BECARD CMSS08B00645T-099TOPY-099M-099NJ-099NJ-6WGY-0B
117	KACHU/BECARD//WBLL1*2/BRAMBLINGCMSS07B00580T-099TOPY-099M-099NJ-099NJ-10WGY-0B
118	KIRITATI//2*PRL/2*PASTOR/3/CHONTE/5/PRL/2*PASTOR/4/CHOIX/STAR/3/HE1/3*CNO79//2*SERICMSS08B00732T-099TOPY-099M-099Y-6M-0WGY
119	AFTAB
120	TACUPETO F2001*2/BRAMBLING// KIRITATI/ 2*TRCHCMSS08Y00140S-099Y-099M-099NJ-29WGY-0B

Supplementary Table 1 (Continued).

No.

No.	
121	LERKE/5/KAUZ/3/MYNA/VUL//BUC/FLK/4/MILAN/6/PROGRESO F2007/7/KIRITATI/4/ 2*SERI.1B*2/ 3/KAUZ*2/BOW//KAUZ CMSS08B00400S-099M-099Y-25M-0WGY
122	92.001E7.32.5/SLVS/4/WHEAR/KUKUNA/3/C80.1/3*BATAVIA//2*WBLL1CMSA08M00321S-040M-0NJ-14Y-0B
123	QUAIU #1CGSS01B00046T-099Y-099M-099M-099Y-099M-29Y-0B-12B-0Y
124	BECARD/PFUNYE #1CMSS09Y00374S-099Y-099M-099Y-10WGY-0B
125	MEX94.27.1.20/3/SOKOLL//ATTILA/3*BCN/4/PUB94.15.1.12/WBLL1PTSS09GHB00029S-0SHB-099Y-11Y-020Y-0MXI
126	SOKOLL/3/PASTOR//HXL7573/2*BAU/4/SRMA/TUIPTSA08M00045S-050ZTM-050Y-28ZTM-010Y-0B
127	SOKOLL/3/PASTOR//HXL7573/2*BAU/4/MEX94.2.19//SOKOLL/WBLL1PTSA08M00050S-050ZTM-050Y-56ZTM-010Y-0B
128	PASTOR/KAUZ/6/CNDO/R143//ENTE/MEXI_2/3/AEGILOPS SQUARROSA (TAUS)/ 4/WEAVER /5/2*KAUZ/7/2*PRL/ 2*PASTOR//PBW343*2/ KUKUNACMSS09Y01016T-099TOPM-099Y-099M-099Y-21WGY-0B
129	KACHU/3/PBW343*2/KUKUNA//PBW343*2/KUKUNACMSS09B00277S-099ZTM-099NJ-099NJ-19WGY-0B
130	BAJ #1/3/TRCH/SRTU//KACHUCMSS 10Y00030S-099Y-099M-11WGY-0B
131	KACHU/SAUAL/8/ATTILA*2/PBW65/6/PVN//CAR422/ANA/5/BOW/CROW//BUC/PVN/3/YR/4/TRAP#1/7/ATTILA/2*PASTORC MSS10Y00374S-099Y-099M-1WGY-0B
132	KACHU/SAUAL/3/TRCH/SRTU//KACHUCMSS10Y00375S-099Y-099M-6WGY-0B
133	ROLF07/3/TRCH/SRTU//KACHU/4/SAUAL/MUTUSCMSS10Y00986T-099TOPM-099Y-099M-7WGY-0B
134	MUTUS//ND643/2*WBLL1CMSS08Y00224S-099Y-099M-099Y-7M-0RGY
135	Dehdasht
136	ALTAR84/STINT//SILVER_45/3/LLARETAINIACDSS99 Y00376S-0M-0Y-13Y-0M-0Y-2M-0Y
137	OROBEL//BUSHEN_4/2*GREEN_18/8/GEDIZ/FGO//GTA/3/SRN_1/4/TOTUS/5/ENTE/MEXI_2//HUI/4/YAV_1/3/LD357E/2*TC 60//JO69/6/SOMBRA_20/7/JUPARE C 2001CDSS07Y00746T-099Y-099M-5Y-3M-04Y-0B
138	Bezajihan*Ossl1/Stj5/5/Bicrederaa1/4/BezaizSHF//SD19539/Waha/3/Stj/Mrb3/6/Icajihan12
139	BCRIS/BICUM//LLARETA INIA/3/DUKEM_12/2*RASCON_21/5/1A.1D 5+1 - 06/3*MOJO//RCOL/4/ARMENT//SRN_3/NIGRIS_4/3/CANELO_9.1 CDSS07Y00068S-099Y-099M-4Y-3M-04Y-0B
140	MÂALI/6/MUSK_1//ACO89/FNFOOT_2/4/MUSK_4/3/PLATA_3//CREX/ALLA/5/OLUS*2/ILBOR//PATKA_7/YAZI_1/10/SELIM/ 9/ALTAR 84/860137 //YAZI _1/4/LIS_8/FILLO_6/3/FUUT// HORA/JOR/8/GEDIZ/FGO//GTA/3/ SRN_1/4/ TOTUS/5/ENTE/MEXI_2//HUI/4/YAV_1/3/LD357E/2*TC60// JO69/6/SOMBRACDSS07Y00784D-2B-07Y-07M-8Y-1B-04Y-0B
141	WID22202/4/SORA/2*PLATA_12//SOMAT_3/3/AJAIA_12/F3LOCAL(SEL.ETHIO.135.85)//PLATA_13/5/CF4-JS 21//TECA96/TILO_1CDSS07B00 683T-0TOPY-099Y-014M-20Y-1M-0Y
142	EXELDUR/8/GEDIZ/FGO//GTA/3/SRN_1/4/TOTUS/5/ENTE/MEXI_2//HUI/4/YAV_1/3/LD357E/2*TC60//JO69/6/SOMBRA_20/ 7/JUPARE C 2001/9/ SOMAT_3/ PHAX_1//TILO_1/ LOTUS_ 4/3/RASCON_22/RASCON_21// MOJO_2 CDSS08Y00900T-0TOPB-099Y-07M-13Y-3M-0Y
143	PLATA_6/GREEN_17//SNITAN/4/ARMENT//SRN_3/NIGRIS_4/3/CANELO_9.1/11/ARTICO/AJAIA_3//HUALITA/10/PLATA_10 /6/MQUE/4/USDA573//QFN/AA_7/3/ALBA-D/5/AVO/HUI /7/PLATA _13/8/THKNEE_11/9/CHEN/ ALTAR 84/3/HUI/ POC//BUB/RUFO/4/FNFOOT CDSS08Y00518S-099Y-025M-11Y-1M-0Y
144	SOMAT_3/GREEN_22/4/GODRIN/GUTROS//DUKEM/3/THKNEE_11/7/CMH83.2578/4/D88059//WARD/YAV79/3/ACO89/5/2* SOOTY_9/RASCON_37/6/1A.1D 5+1-06/3*MOJO/3/AJAIA _12/F3LOCAL(SEL.ETHIO.135.85)// PLATA_13 CDSS08Y00394S-099Y-025M-9Y-2M-0Y
145	TOPDY_18/FOCHA_1//ALTAR 84/3/AJAIA_12/F3LOCAL(SEL.ETHIO. 135.85)// PLATA_13/4/SOMAT_3/GREEN_22/6/LAHN/HCN//PATA_2/3/ SOMAT_4/INTER_8/5/CREX//BOY/YAV_1/3/PLATA_6/4/PORRON_11CDSS07B00051S-099Y-018M-1Y-2M-0Y
146	Mrf1/Stj2/3/1718/BT24//Karim = Icajihan*ICD01-0251-T-8AP-TR-8AP-0AP-5AP-0AP-2AP-0AP-2AP-0AP-0TR
147	Terbol975/Geruftel2*ICD06-1790-0AP-4AP-0AP-4AP-0THTD-0TR
148	Maamouri1/5/IcamorTA0462/4/Stj3//Bcr/Lks4/3/Icamor"s"/6/Mgnl3/Ainzen1*ICD06-0367-BLMSD-0AP-2AP-0Tr-2AP-0Tr-4AP-0THT-0AP-0TR
149	Mgnl3/Ainzen1/3/IcamorTA0463//H.mouline/Sbl2/4/Mgnl3/Ainzen1*ICD06-0261-BLMSD-0AP-1AP-0Tr-4AP-0Tr-2AP-0THT-0AP-0TR
150	PH896-21/5/BRAK_2/AJAIA_2//SOLGA_8/3/CANELO_8//SORA/2*PLATA _ 12/4/YAZI_1/AKAKI_4//SOMAT_3/3/AUK/GUIL//GREEN/6/HUBEI// SOOTY_9/RASCON_37/3/2*SOOTY_9/RASCON_37/4/SOOTY_9/ RASCON_37CDSS07Y00461T-099Y-099M-1Y-3M-04Y-0B

Supplementary Table 2. Nonparametric stability statistics for disease severity (DS).

	DS	MR	S1	S2	S3	S4	S5	S6	Top	Mid	Low	NP1	NP2	NP3	NP4	NS1	NS2
G1	34.00	91.50	62.13	2841.70	349.71	111.03	33.42	5.69	83.33	0.00	16.67	41.83	0.31	0.42	0.68	0.34	0.95
G2	25.00	83.17	31.53	693.77	76.74	61.01	20.83	2.58	66.67	33.33	0.00	21.50	0.20	0.23	0.38	0.48	0.69
G3	21.00	81.92	27.77	536.74	47.30	54.48	18.33	1.75	16.67	83.33	0.00	20.42	0.22	0.24	0.34	0.42	0.74
G4	11.33	82.25	52.63	1954.97	70.68	84.39	23.83	1.42	16.67	16.67	66.67	31.08	0.63	0.80	0.64	1.01	2.27
G5	11.83	78.17	55.27	2177.04	92.59	95.78	27.36	1.66	16.67	0.00	83.33	32.17	0.70	0.82	0.71	1.12	2.56
G6	17.83	83.17	52.73	1966.97	84.54	78.83	27.50	2.24	16.67	66.67	16.67	36.17	0.45	0.52	0.63	0.64	1.28
G7	14.17	77.67	33.13	835.07	33.35	54.58	20.56	1.38	0.00	33.33	66.67	20.00	0.40	0.43	0.43	0.91	1.17
G8	31.33	81.33	42.40	1248.54	79.13	49.99	16.94	3.22	83.33	16.67	0.00	25.00	0.19	0.27	0.52	0.24	0.46
G9	32.00	79.08	63.77	2867.64	44.96	37.18	13.25	2.59	83.33	16.67	0.00	47.58	0.38	0.41	0.81	0.24	0.32
G10	21.00	71.92	43.50	1422.84	63.03	61.33	22.67	2.28	33.33	66.67	0.00	29.92	0.35	0.38	0.60	0.58	0.82
G11	17.50	67.50	58.73	2967.10	136.62	102.68	39.11	3.04	33.33	0.00	66.67	37.50	0.76	0.67	0.87	1.79	2.06
G12	16.17	81.08	60.57	2569.44	105.04	92.57	35.58	2.62	16.67	33.33	50.00	43.58	0.64	0.67	0.75	1.01	1.54
G13	25.00	81.33	70.13	3493.27	182.77	104.36	37.75	3.80	50.00	16.67	33.33	49.50	0.47	0.59	0.86	0.83	1.07
G14	31.33	75.08	64.77	3154.28	199.92	99.31	37.44	4.55	66.67	0.00	33.33	38.42	0.31	0.50	0.86	0.69	0.84
G15	24.33	83.92	42.37	1248.80	79.11	64.50	22.44	2.56	66.67	33.33	0.00	30.92	0.29	0.33	0.50	0.43	0.75
G16	17.83	71.17	63.87	2987.27	125.69	95.19	36.58	3.05	33.33	16.67	50.00	49.17	0.66	0.63	0.90	0.98	1.46
G17	25.67	73.17	57.80	2291.80	115.81	73.45	24.92	3.21	50.00	33.33	16.67	38.83	0.37	0.42	0.79	0.48	0.89
G18	27.67	78.58	63.10	2648.20	136.34	78.04	24.39	3.28	66.67	16.67	16.67	37.33	0.34	0.44	0.80	0.49	0.90
G19	20.67	82.75	25.63	496.07	18.28	34.23	11.61	1.09	16.67	83.33	0.00	16.17	0.18	0.23	0.31	0.26	0.48
G20	26.50	83.92	60.17	2510.84	130.74	77.41	25.11	3.29	66.67	16.67	16.67	41.42	0.35	0.43	0.72	0.39	0.83
G21	24.00	82.25	55.17	2061.88	74.39	62.69	20.83	2.37	50.00	50.00	0.00	37.42	0.37	0.42	0.67	0.40	0.81
G22	19.17	77.92	44.30	1387.38	62.75	65.56	21.67	1.90	16.67	66.67	16.67	26.58	0.36	0.41	0.57	0.57	1.15
G23	34.50	83.42	62.57	2815.34	61.32	40.18	11.89	2.71	83.33	16.67	0.00	42.42	0.32	0.39	0.75	0.14	0.36
G24	12.67	80.00	30.40	611.97	15.30	38.68	13.22	0.81	0.00	33.33	66.67	18.58	0.38	0.43	0.38	0.61	0.97
G25	24.67	80.75	59.03	2547.48	81.03	66.86	22.67	2.47	50.00	33.33	16.67	45.42	0.46	0.48	0.73	0.47	0.79
G26	30.33	76.00	42.40	1250.47	19.39	25.01	8.00	1.49	100.00	0.00	0.00	28.33	0.25	0.27	0.56	0.14	0.26
G27	25.33	70.83	38.27	1048.00	35.76	40.48	15.22	1.99	33.33	66.67	0.00	24.00	0.25	0.28	0.54	0.34	0.45
G28	20.17	74.08	27.23	545.97	13.71	30.17	9.78	0.88	16.67	83.33	0.00	17.58	0.22	0.25	0.37	0.25	0.44
G29	26.33	75.00	53.73	1918.08	89.34	66.27	23.56	2.87	66.67	33.33	0.00	35.50	0.32	0.39	0.72	0.50	0.69
G30	11.50	67.25	77.63	4164.28	156.17	125.38	47.50	2.83	33.33	16.67	50.00	56.42	1.78	1.17	1.15	3.53	3.73
G31	15.50	65.83	65.87	2950.07	103.44	94.91	34.89	2.40	33.33	16.67	50.00	44.50	0.88	0.78	1.00	1.74	1.94
G32	13.17	69.42	54.10	1950.64	56.62	75.49	27.78	1.66	16.67	16.67	66.67	37.25	1.10	0.81	0.78	1.76	2.38
G33	8.67	77.92	30.43	748.64	24.41	53.57	15.86	0.81	0.00	16.67	83.33	16.42	0.66	0.75	0.39	0.99	2.62
G34	12.00	79.75	53.37	1964.88	75.37	85.28	26.33	1.64	16.67	16.67	66.67	32.25	0.65	0.74	0.67	1.16	2.17
G35	25.17	80.00	54.87	2151.70	61.89	57.41	20.92	2.36	50.00	50.00	0.00	40.83	0.43	0.43	0.69	0.53	0.68
G36	22.00	66.67	72.93	3586.27	104.71	81.86	32.33	3.03	50.00	16.67	33.33	50.00	0.58	0.63	1.09	0.89	0.91
G37	8.50	60.08	75.30	4164.04	133.37	121.35	46.11	2.51	16.67	16.67	66.67	49.92	5.25	1.45	1.25	10.70	12.47
G38	12.83	79.58	16.37	198.54	9.56	31.22	8.83	0.52	0.00	16.67	83.33	9.42	0.19	0.26	0.21	0.36	0.85
G39	8.67	70.00	55.20	2008.84	20.30	49.42	17.39	0.87	0.00	16.67	83.33	37.50	1.52	1.34	0.78	1.69	2.22
G40	33.00	59.08	59.30	2821.44	40.70	34.50	12.17	2.50	100.00	0.00	0.00	36.08	0.31	0.40	1.00	0.22	0.33
G41	30.83	82.75	56.10	2197.88	115.99	66.02	20.44	3.26	83.33	16.67	0.00	36.42	0.29	0.38	0.68	0.27	0.62
G42	31.67	81.25	65.50	3022.58	85.66	56.04	21.06	3.45	66.67	33.33	0.00	40.67	0.32	0.44	0.80	0.38	0.46
G43	28.17	59.08	81.90	5193.84	299.20	146.26	58.33	4.90	50.00	0.00	50.00	56.00	0.81	0.83	1.38	1.85	1.97
G44	17.67	64.67	54.87	2313.57	90.75	90.41	29.39	1.96	16.67	16.67	66.67	35.00	0.71	0.72	0.85	1.13	2.39
G45	23.67	50.00	59.87	3189.47	155.25	110.98	35.61	2.69	16.67	50.00	33.33	34.67	0.47	0.72	1.19	1.18	1.82
G46	24.33	81.67	74.47	3827.37	207.21	121.50	44.83	3.78	50.00	16.67	33.33	52.67	0.54	0.71	0.91	1.20	1.22
G47	32.50	81.42	75.83	3944.24	201.49	90.70	34.61	5.09	66.67	33.33	0.00	51.92	0.39	0.52	0.93	0.58	0.66
G48	14.33	54.08	60.83	2848.98	112.50	105.31	32.56	1.98	16.67	16.67	66.67	37.33	1.20	0.93	1.12	1.75	3.87
G49	47.83	75.17	89.13	6542.97	226.87	95.66	38.83	5.78	50.00	50.00	0.00	73.83	0.65	0.67	1.19	0.71	0.74
G50	10.83	85.50	52.93	2066.44	55.81	74.52	25.00	1.51	0.00	33.33	66.67	32.83	0.66	0.80	0.62	1.33	1.77
G51	12.17	81.92	41.17	1166.58	42.30	64.08	19.06	1.18	16.67	16.67	66.67	24.08	0.49	0.58	0.50	0.79	1.63
G52	3.83	69.08	60.97	2464.57	18.95	50.90	15.22	0.67	0.00	16.67	83.33	40.75	10.87	3.16	0.88	6.03	15.33
G53	15.00	88.00	54.07	2222.40	83.40	84.07	31.25	2.21	16.67	33.33	50.00	35.83	0.50	0.65	0.61	0.82	1.35
G54	36.00	77.75	81.50	5286.98	148.18	68.95	24.44	4.57	66.67	33.33	0.00	66.25	0.51	0.56	1.05	0.42	0.56
G55	12.83	76.33	62.20	2630.77	120.37	104.28	36.56	2.43	16.67	16.67	66.67	38.08	0.77	0.77	0.81	1.73	2.52
G56	10.50	70.92	62.77	2722.14	26.00	54.56	17.33	0.91	0.00	16.67	83.33	41.42	1.05	1.30	0.89	1.03	1.66

DS: Disease severity, MR: Mean rank.

Supplementary Table 2 (Continued).

	DS	MR	S1	S2	S3	S4	S5	S6	Top	Mid	Low	NP1	NP2	NP3	NP4	NS1	NS2
G57	29.50	66.92	66.90	3050.54	160.90	91.84	33.22	3.80	66.67	16.67	16.67	40.25	0.37	0.51	1.00	0.72	0.95
G58	18.67	56.67	57.27	2621.90	127.98	106.62	35.83	2.42	16.67	33.33	50.00	38.67	0.69	0.75	1.01	1.19	2.39
G59	50.83	79.00	76.40	4067.60	208.08	63.56	20.56	6.35	83.33	16.67	0.00	53.33	0.37	0.44	0.97	0.23	0.50
G60	46.50	84.83	68.07	3497.37	334.51	92.21	27.53	6.50	83.33	0.00	16.67	41.83	0.29	0.43	0.80	0.30	0.74
G61	3.00	80.50	35.33	868.80	0.63	9.43	3.00	0.13	0.00	0.00	100.00	20.67	1.97	2.63	0.44	0.68	1.14
G62	23.67	80.67	65.67	3138.80	163.96	104.81	38.33	3.43	50.00	16.67	33.33	48.67	0.50	0.61	0.81	0.84	1.21
G63	14.83	74.33	42.80	1331.44	56.25	72.33	23.67	1.53	0.00	50.00	50.00	26.25	0.51	0.57	0.57	1.00	1.75
G64	17.33	72.75	41.03	1165.98	44.36	59.51	20.33	1.53	16.67	50.00	33.33	26.42	0.42	0.44	0.57	0.71	1.07
G65	16.33	57.33	68.60	3344.77	116.18	107.38	37.50	2.27	16.67	16.67	66.67	44.75	1.54	1.02	1.21	2.46	4.36
G66	29.67	88.25	63.17	2771.58	280.40	105.46	31.94	4.83	83.33	0.00	16.67	40.92	0.31	0.43	0.72	0.30	0.91
G67	12.00	81.42	19.03	266.44	2.49	16.16	5.50	0.31	0.00	16.67	83.33	11.25	0.24	0.32	0.23	0.24	0.43
G68	15.00	77.17	21.47	327.07	7.82	26.70	9.94	0.65	0.00	66.67	33.33	15.83	0.29	0.28	0.28	0.44	0.49
G69	27.00	77.17	44.67	1395.97	75.98	59.07	17.22	2.25	83.33	16.67	0.00	25.83	0.23	0.32	0.58	0.27	0.73
G70	23.33	78.58	31.77	739.38	16.04	29.61	9.33	1.02	33.33	66.67	0.00	17.58	0.18	0.26	0.40	0.20	0.38
G71	35.17	78.00	78.27	4787.20	164.19	74.07	27.06	4.86	66.67	33.33	0.00	63.08	0.48	0.54	1.01	0.44	0.63
G72	30.83	82.00	60.87	2644.90	107.81	61.94	20.61	3.48	83.33	16.67	0.00	44.92	0.35	0.41	0.74	0.28	0.57
G73	42.17	83.17	77.53	4132.57	177.83	59.64	17.83	5.35	83.33	16.67	0.00	55.67	0.39	0.45	0.93	0.20	0.48
G74	33.50	87.08	65.97	3389.74	147.89	71.77	26.94	4.64	66.67	33.33	0.00	41.08	0.32	0.46	0.76	0.49	0.58
G75	26.33	81.50	56.73	2303.30	107.98	72.37	22.33	2.76	66.67	16.67	16.67	40.50	0.36	0.43	0.70	0.36	0.76
G76	54.33	77.83	83.93	5439.94	58.34	24.55	8.44	4.90	100.00	0.00	0.00	66.75	0.46	0.48	1.08	0.12	0.19
G77	52.67	89.33	79.33	4820.18	96.39	36.41	14.00	6.11	100.00	0.00	0.00	56.08	0.38	0.46	0.89	0.22	0.22
G78	34.00	78.17	83.73	5122.67	330.47	133.59	48.33	5.37	50.00	16.67	33.33	64.33	0.53	0.67	1.07	0.94	1.15
G79	41.00	80.00	75.87	4045.20	196.09	79.93	30.28	5.58	66.67	33.33	0.00	51.67	0.37	0.49	0.95	0.46	0.60
G80	21.50	80.50	67.47	3104.80	126.60	93.18	33.78	2.96	33.33	33.33	33.33	48.33	0.52	0.62	0.84	0.97	1.00
G81	20.83	74.00	29.53	597.30	26.04	40.05	14.42	1.40	16.67	83.33	0.00	18.83	0.22	0.25	0.40	0.34	0.52
G82	16.83	83.08	32.03	749.87	28.91	48.29	16.06	1.19	0.00	83.33	16.67	18.33	0.25	0.36	0.39	0.47	0.83
G83	33.67	70.33	59.33	2446.47	41.53	33.74	12.44	2.72	100.00	0.00	0.00	40.83	0.35	0.37	0.86	0.27	0.28
G84	26.67	83.08	28.43	643.67	22.11	30.62	8.75	1.24	83.33	16.67	0.00	16.25	0.15	0.21	0.34	0.14	0.39
G85	19.50	69.33	69.00	3235.37	91.35	82.82	31.92	2.55	33.33	16.67	50.00	49.33	0.71	0.68	1.00	1.03	1.25
G86	27.00	76.00	58.73	2395.40	140.29	85.34	24.39	2.82	66.67	16.67	16.67	34.67	0.32	0.45	0.77	0.36	1.06
G87	20.33	72.50	51.60	2025.77	71.72	73.26	24.06	1.93	33.33	50.00	16.67	30.75	0.41	0.54	0.71	0.84	1.16
G88	34.83	76.17	64.47	2942.57	41.28	32.39	11.89	2.81	100.00	0.00	0.00	45.75	0.35	0.39	0.85	0.23	0.25
G89	22.83	71.42	37.57	1139.44	47.72	54.58	15.81	1.52	16.67	83.33	0.00	21.08	0.25	0.35	0.53	0.28	0.84
G90	16.50	79.42	45.50	1395.14	43.83	62.45	21.67	1.46	0.00	66.67	33.33	30.25	0.50	0.55	0.57	1.03	1.05
G91	16.17	67.08	40.23	1335.30	48.14	64.96	19.78	1.35	16.67	16.67	66.67	25.25	0.51	0.53	0.60	0.62	1.53
G92	6.00	73.25	35.17	862.98	8.86	33.89	13.25	0.61	0.00	0.00	100.00	21.92	1.07	1.25	0.48	1.26	1.83
G93	15.17	75.75	32.17	768.27	26.23	47.95	18.11	1.24	0.00	33.33	66.67	21.83	0.44	0.40	0.42	0.76	0.95
G94	18.33	77.83	50.60	1726.04	74.17	74.00	24.39	1.98	16.67	50.00	33.33	29.25	0.39	0.49	0.65	0.81	1.22
G95	15.67	73.58	31.97	688.64	29.45	51.32	17.58	1.18	0.00	50.00	50.00	22.92	0.41	0.39	0.43	0.67	1.14
G96	9.17	67.42	69.03	3600.44	66.78	86.77	30.08	1.60	16.67	16.67	66.67	54.42	2.03	1.44	1.02	2.26	3.78
G97	9.33	77.75	52.03	1891.07	30.68	59.81	22.22	1.14	0.00	33.33	66.67	32.17	1.29	1.16	0.67	2.18	2.52
G98	22.00	82.25	25.30	661.18	54.04	57.61	16.19	1.58	16.67	66.67	16.67	13.25	0.14	0.26	0.31	0.22	0.83
G99	37.50	86.17	64.80	3098.67	100.66	49.58	18.22	4.48	83.33	16.67	0.00	42.00	0.30	0.40	0.75	0.27	0.38
G100	3.17	64.83	55.87	2285.47	66.47	92.15	27.58	1.30	16.67	0.00	83.33	38.00	10.86	1.87	0.86	11.46	29.57
G101	4.17	82.33	37.07	982.18	3.37	21.53	7.61	0.33	0.00	0.00	100.00	26.00	2.17	2.11	0.45	1.76	1.79
G102	18.50	76.00	21.47	329.80	18.12	37.57	10.56	0.81	0.00	83.33	16.67	12.33	0.17	0.23	0.28	0.27	0.68
G103	38.33	91.92	76.63	4828.64	384.22	118.42	39.50	6.49	66.67	16.67	16.67	50.17	0.35	0.55	0.83	0.48	0.93
G104	17.50	54.50	45.33	2204.20	115.59	104.97	30.06	1.89	16.67	16.67	66.67	25.00	0.51	0.77	0.83	1.22	2.65
G105	20.17	70.58	52.43	1980.04	108.67	92.46	29.39	2.24	16.67	50.00	33.33	31.25	0.42	0.56	0.74	0.93	1.60
G106	20.17	83.50	45.33	1666.60	91.36	83.51	30.94	2.43	16.67	50.00	33.33	27.50	0.29	0.50	0.54	0.69	0.97
G107	23.50	85.08	50.23	1773.14	140.30	92.57	31.94	3.14	66.67	16.67	16.67	32.25	0.29	0.43	0.59	0.55	0.96
G108	21.00	80.92	64.03	3003.54	131.03	97.91	35.17	2.88	50.00	16.67	33.33	48.92	0.55	0.64	0.79	0.96	1.16
G109	19.50	81.92	32.97	779.74	48.59	60.13	20.72	1.67	0.00	83.33	16.67	21.58	0.24	0.33	0.40	0.46	0.78
G110	21.17	83.83	26.60	731.67	55.91	60.86	17.50	1.58	16.67	66.67	16.67	15.00	0.16	0.29	0.32	0.30	0.88
G111	14.33	68.00	57.93	2274.34	32.26	57.30	21.00	1.24	0.00	33.33	66.67	36.50	0.87	0.89	0.85	1.29	1.39
G112	18.33	65.83	57.67	2340.67	56.60	69.09	23.72	1.69	16.67	33.33	50.00	36.33	0.63	0.66	0.88	0.88	1.48

DS: Disease severity, MR: Mean rank.

Supplementary Table 2 (Continued).

	DS	MR	S1	S2	S3	S4	S5	S6	Top	Mid	Low	NP1	NP2	NP3	NP4	NS1	NS2
G113	19.33	61.67	76.00	4206.17	169.86	120.51	45.67	3.20	33.33	0.00	66.67	49.50	1.32	0.90	1.23	2.89	2.93
G114	14.50	69.42	58.77	2436.84	36.29	59.43	21.00	1.29	0.00	50.00	50.00	35.58	0.67	0.84	0.85	1.04	1.23
G115	16.50	72.33	32.40	738.47	19.38	40.92	12.58	0.87	0.00	66.67	33.33	21.00	0.34	0.38	0.45	0.43	0.80
G116	16.00	74.33	32.73	741.57	17.40	38.91	15.00	1.03	0.00	50.00	50.00	23.17	0.38	0.39	0.44	0.50	0.68
G117	23.17	64.17	53.07	2031.40	56.31	56.99	19.33	2.01	33.33	66.67	0.00	32.92	0.39	0.44	0.83	0.46	0.76
G118	20.50	82.92	31.77	726.44	13.22	30.40	11.58	0.99	0.00	100.00	0.00	22.42	0.27	0.30	0.38	0.34	0.35
G119	20.50	72.33	42.07	1431.97	44.87	56.21	20.28	1.73	33.33	66.67	0.00	25.50	0.34	0.43	0.58	0.70	0.81
G120	17.17	71.25	52.23	1989.48	49.84	66.04	23.83	1.63	16.67	33.33	50.00	37.42	0.59	0.64	0.73	0.70	1.30
G121	16.50	71.00	36.27	909.20	25.08	46.91	15.92	1.09	0.00	50.00	50.00	23.67	0.41	0.44	0.51	0.55	0.99
G122	29.17	44.25	51.83	2826.64	71.92	63.56	17.72	1.89	16.67	83.33	0.00	29.58	0.33	0.51	1.17	0.32	0.94
G123	19.00	76.58	26.70	606.14	14.86	33.70	10.28	0.81	0.00	100.00	0.00	15.08	0.20	0.30	0.35	0.33	0.58
G124	11.33	64.50	76.33	4298.30	134.43	117.48	44.61	2.61	33.33	0.00	66.67	57.67	2.78	1.23	1.18	5.02	5.33
G125	13.67	68.33	54.20	1917.28	43.08	65.08	22.39	1.37	0.00	33.33	66.67	35.75	0.76	0.76	0.79	1.17	1.59
G126	19.83	77.08	32.57	812.24	46.05	55.82	20.61	1.83	33.33	66.67	0.00	20.92	0.28	0.31	0.42	0.65	0.83
G127	32.33	61.33	53.33	2195.47	34.47	31.57	10.78	2.24	100.00	0.00	0.00	33.00	0.28	0.35	0.86	0.20	0.31
G128	22.50	64.42	49.50	1878.54	60.90	62.63	19.28	1.80	16.67	83.33	0.00	30.25	0.40	0.46	0.77	0.41	1.03
G129	25.67	83.75	53.10	2108.68	126.81	83.58	30.61	3.33	66.67	16.67	16.67	32.25	0.29	0.44	0.63	0.62	0.87
G130	23.50	71.08	46.23	1798.64	136.05	92.76	28.00	2.66	33.33	50.00	16.67	24.08	0.26	0.44	0.65	0.57	1.34
G131	19.83	72.33	47.47	1592.60	71.67	74.85	23.56	1.81	16.67	50.00	33.33	28.08	0.38	0.50	0.66	0.73	1.31
G132	22.17	68.08	56.63	2611.14	87.75	76.72	25.72	2.30	33.33	50.00	16.67	36.42	0.48	0.56	0.83	0.73	1.27
G133	23.50	62.42	59.57	2712.64	66.59	62.68	23.17	2.36	33.33	66.67	0.00	36.42	0.48	0.52	0.95	0.62	0.87
G134	16.83	70.00	41.00	1146.30	41.12	60.24	19.42	1.32	16.67	33.33	50.00	27.00	0.47	0.49	0.59	0.63	1.37
G135	8.33	75.08	59.23	2318.70	79.70	94.55	30.28	1.62	16.67	0.00	83.33	34.92	1.40	1.13	0.79	2.32	4.60
G136	3.33	78.83	47.67	1530.84	2.61	19.13	5.78	0.25	0.00	0.00	100.00	27.67	2.63	3.29	0.60	1.26	2.33
G137	10.33	83.58	42.17	1191.04	30.80	57.88	19.58	1.08	0.00	16.67	83.33	29.42	0.74	0.75	0.50	0.93	1.85
G138	8.00	83.50	54.47	2102.50	27.03	56.63	22.33	1.13	0.00	16.67	83.33	35.83	1.14	1.29	0.65	1.37	1.94
G139	5.67	69.75	52.17	1964.34	62.07	87.20	26.33	1.29	16.67	0.00	83.33	31.58	2.63	1.42	0.75	2.77	8.33
G140	3.00	80.92	40.30	1096.04	0.85	10.96	3.89	0.17	0.00	0.00	100.00	24.08	2.29	3.15	0.50	0.96	1.14
G141	7.17	80.08	44.90	1413.54	32.56	62.73	18.78	0.93	0.00	16.67	83.33	25.58	1.26	1.14	0.56	1.25	3.60
G142	9.67	78.17	35.13	869.18	14.39	41.17	14.22	0.72	0.00	16.67	83.33	22.25	0.86	0.81	0.45	1.05	2.00
G143	6.83	71.67	50.73	1814.28	16.33	45.95	13.78	0.64	0.00	16.67	83.33	37.50	2.88	1.80	0.71	1.56	4.04
G144	7.17	81.33	32.73	811.17	2.15	16.54	5.94	0.28	0.00	0.00	100.00	17.67	0.71	1.11	0.40	0.63	0.70
G145	13.00	83.58	47.77	1603.24	60.39	76.21	27.17	1.69	0.00	66.67	33.33	33.08	0.51	0.67	0.57	1.01	1.30
G146	7.00	83.25	38.23	1029.38	4.10	22.78	6.39	0.30	0.00	0.00	100.00	23.92	0.96	1.20	0.46	0.48	1.26
G147	11.00	76.50	62.80	2704.20	73.56	89.34	34.33	1.90	0.00	33.33	66.67	39.50	2.08	1.12	0.82	4.16	4.24
G148	8.33	75.67	38.93	1071.87	7.84	31.33	11.78	0.56	0.00	0.00	100.00	27.58	1.43	1.14	0.51	1.45	1.58
G149	9.67	83.83	35.00	936.84	2.79	18.04	5.17	0.27	0.00	0.00	100.00	19.75	0.57	0.81	0.42	0.32	0.67
G150	3.00	72.75	47.90	1687.58	4.00	23.40	7.42	0.32	0.00	0.00	100.00	31.08	2.49	2.69	0.66	1.19	2.24

DS: Disease severity, MR: Mean rank.

Supplementary Table 3. Nonparametric stability statistics for coefficient of infection (CI).

	CI	MR	S1	S2	S3	S4	S5	S6	Top	Mid	Low	NP1	NP2	NP3	NP4	NS1	NS2
G1	34.00	91.50	62.13	2841.70	349.71	111.03	33.42	5.69	83.33	0.00	16.67	41.83	0.31	0.42	0.68	0.34	0.95
G2	25.00	83.17	31.53	693.77	76.74	61.01	20.83	2.58	66.67	33.33	0.00	21.50	0.20	0.23	0.38	0.48	0.69
G3	21.00	81.92	27.77	536.74	47.30	54.48	18.33	1.75	16.67	83.33	0.00	20.42	0.22	0.24	0.34	0.42	0.74
G4	11.33	82.25	52.63	1954.97	70.68	84.39	23.83	1.42	16.67	16.67	66.67	31.08	0.63	0.80	0.64	1.01	2.27
G5	11.83	78.17	55.27	2177.04	92.59	95.78	27.36	1.66	16.67	0.00	83.33	32.17	0.70	0.82	0.71	1.12	2.56
G6	17.83	83.17	52.73	1966.97	84.54	78.83	27.50	2.24	16.67	66.67	16.67	36.17	0.45	0.52	0.63	0.64	1.28
G7	14.17	77.67	33.13	835.07	33.35	54.58	20.56	1.38	0.00	33.33	66.67	20.00	0.40	0.43	0.43	0.91	1.17
G8	31.33	81.33	42.40	1248.54	79.13	49.99	16.94	3.22	83.33	16.67	0.00	25.00	0.19	0.27	0.52	0.24	0.46
G9	32.00	79.08	63.77	2867.64	44.96	37.18	13.25	2.59	83.33	16.67	0.00	47.58	0.38	0.41	0.81	0.24	0.32
G10	21.00	71.92	43.50	1422.84	63.03	61.33	22.67	2.28	33.33	66.67	0.00	29.92	0.35	0.38	0.60	0.58	0.82
G11	17.50	67.50	58.73	2967.10	136.62	102.68	39.11	3.04	33.33	0.00	66.67	37.50	0.76	0.67	0.87	1.79	2.06
G12	16.17	81.08	60.57	2569.44	105.04	92.57	35.58	2.62	16.67	33.33	50.00	43.58	0.64	0.67	0.75	1.01	1.54
G13	25.00	81.33	70.13	3493.27	182.77	104.36	37.75	3.80	50.00	16.67	33.33	49.50	0.47	0.59	0.86	0.83	1.07
G14	31.33	75.08	64.77	3154.28	199.92	99.31	37.44	4.55	66.67	0.00	33.33	38.42	0.31	0.50	0.86	0.69	0.84
G15	24.33	83.92	42.37	1248.80	79.11	64.50	22.44	2.56	66.67	33.33	0.00	30.92	0.29	0.33	0.50	0.43	0.75
G16	17.83	71.17	63.87	2987.27	125.69	95.19	36.58	3.05	33.33	16.67	50.00	49.17	0.66	0.63	0.90	0.98	1.46
G17	25.67	73.17	57.80	2291.80	115.81	73.45	24.92	3.21	50.00	33.33	16.67	38.83	0.37	0.42	0.79	0.48	0.89
G18	27.67	78.58	63.10	2648.20	136.34	78.04	24.39	3.28	66.67	16.67	16.67	37.33	0.34	0.44	0.80	0.49	0.90
G19	20.67	82.75	25.63	496.07	18.28	34.23	11.61	1.09	16.67	83.33	0.00	16.17	0.18	0.23	0.31	0.26	0.48
G20	26.50	83.92	60.17	2510.84	130.74	77.41	25.11	3.29	66.67	16.67	16.67	41.42	0.35	0.43	0.72	0.39	0.83
G21	24.00	82.25	55.17	2061.88	74.39	62.69	20.83	2.37	50.00	50.00	0.00	37.42	0.37	0.42	0.67	0.40	0.81
G22	19.17	77.92	44.30	1387.38	62.75	65.56	21.67	1.90	16.67	66.67	16.67	26.58	0.36	0.41	0.57	0.57	1.15
G23	34.50	83.42	62.57	2815.34	61.32	40.18	11.89	2.71	83.33	16.67	0.00	42.42	0.32	0.39	0.75	0.14	0.36
G24	12.67	80.00	30.40	611.97	15.30	38.68	13.22	0.81	0.00	33.33	66.67	18.58	0.38	0.43	0.38	0.61	0.97
G25	24.67	80.75	59.03	2547.48	81.03	66.86	22.67	2.47	50.00	33.33	16.67	45.42	0.46	0.48	0.73	0.47	0.79
G26	30.33	76.00	42.40	1250.47	19.39	25.01	8.00	1.49	100.00	0.00	0.00	28.33	0.25	0.27	0.56	0.14	0.26
G27	25.33	70.83	38.27	1048.00	35.76	40.48	15.22	1.99	33.33	66.67	0.00	24.00	0.25	0.28	0.54	0.34	0.45
G28	20.17	74.08	27.23	545.97	13.71	30.17	9.78	0.88	16.67	83.33	0.00	17.58	0.22	0.25	0.37	0.25	0.44
G29	26.33	75.00	53.73	1918.08	89.34	66.27	23.56	2.87	66.67	33.33	0.00	35.50	0.32	0.39	0.72	0.50	0.69
G30	11.50	67.25	77.63	4164.28	156.17	125.38	47.50	2.83	33.33	16.67	50.00	56.42	1.78	1.17	1.15	3.53	3.73
G31	15.50	65.83	65.87	2950.07	103.44	94.91	34.89	2.40	33.33	16.67	50.00	44.50	0.88	0.78	1.00	1.74	1.94
G32	13.17	69.42	54.10	1950.64	56.62	75.49	27.78	1.66	16.67	16.67	66.67	37.25	1.10	0.81	0.78	1.76	2.38
G33	8.67	77.92	30.43	748.64	24.41	53.57	15.86	0.81	0.00	16.67	83.33	16.42	0.66	0.75	0.39	0.99	2.62
G34	12.00	79.75	53.37	1964.88	75.37	85.28	26.33	1.64	16.67	16.67	66.67	32.25	0.65	0.74	0.67	1.16	2.17
G35	25.17	80.00	54.87	2151.70	61.89	57.41	20.92	2.36	50.00	50.00	0.00	40.83	0.43	0.43	0.69	0.53	0.68
G36	22.00	66.67	72.93	3586.27	104.71	81.86	32.33	3.03	50.00	16.67	33.33	50.00	0.58	0.63	1.09	0.89	0.91
G37	8.50	60.08	75.30	4164.04	133.37	121.35	46.11	2.51	16.67	16.67	66.67	49.92	5.25	1.45	1.25	10.70	12.47
G38	12.83	79.58	16.37	198.54	9.56	31.22	8.83	0.52	0.00	16.67	83.33	9.42	0.19	0.26	0.21	0.36	0.85
G39	8.67	70.00	55.20	2008.84	20.30	49.42	17.39	0.87	0.00	16.67	83.33	37.50	1.52	1.34	0.78	1.69	2.22
G40	33.00	59.08	59.30	2821.44	40.70	34.50	12.17	2.50	100.00	0.00	0.00	36.08	0.31	0.40	1.00	0.22	0.33
G41	30.83	82.75	56.10	2197.88	115.99	66.02	20.44	3.26	83.33	16.67	0.00	36.42	0.29	0.38	0.68	0.27	0.62
G42	31.67	81.25	65.50	3022.58	85.66	56.04	21.06	3.45	66.67	33.33	0.00	40.67	0.32	0.44	0.80	0.38	0.46
G43	28.17	59.08	81.90	5193.84	299.20	146.26	58.33	4.90	50.00	0.00	50.00	56.00	0.81	0.83	1.38	1.85	1.97
G44	17.67	64.67	54.87	2313.57	90.75	90.41	29.39	1.96	16.67	16.67	66.67	35.00	0.71	0.72	0.85	1.13	2.39
G45	23.67	50.00	59.87	3189.47	155.25	110.98	35.61	2.69	16.67	50.00	33.33	34.67	0.47	0.72	1.19	1.18	1.82
G46	24.33	81.67	74.47	3827.37	207.21	121.50	44.83	3.78	50.00	16.67	33.33	52.67	0.54	0.71	0.91	1.20	1.22
G47	32.50	81.42	75.83	3944.24	201.49	90.70	34.61	5.09	66.67	33.33	0.00	51.92	0.39	0.52	0.93	0.58	0.66
G48	14.33	54.08	60.83	2848.98	112.50	105.31	32.56	1.98	16.67	16.67	66.67	37.33	1.20	0.93	1.12	1.75	3.87
G49	47.83	75.17	89.13	6542.97	226.87	95.66	38.83	5.78	50.00	50.00	0.00	73.83	0.65	0.67	1.19	0.71	0.74
G50	10.83	85.50	52.93	2066.44	55.81	74.52	25.00	1.51	0.00	33.33	66.67	32.83	0.66	0.80	0.62	1.33	1.77
G51	12.17	81.92	41.17	1166.58	42.30	64.08	19.06	1.18	16.67	16.67	66.67	24.08	0.49	0.58	0.50	0.79	1.63
G52	3.83	69.08	60.97	2464.57	18.95	50.90	15.22	0.67	0.00	16.67	83.33	40.75	10.87	3.16	0.88	6.03	15.33
G53	15.00	88.00	54.07	2222.40	83.40	84.07	31.25	2.21	16.67	33.33	50.00	35.83	0.50	0.65	0.61	0.82	1.35
G54	36.00	77.75	81.50	5286.98	148.18	68.95	24.44	4.57	66.67	33.33	0.00	66.25	0.51	0.56	1.05	0.42	0.56
G55	12.83	76.33	62.20	2630.77	120.37	104.28	36.56	2.43	16.67	16.67	66.67	38.08	0.77	0.77	0.81	1.73	2.52
G56	10.50	70.92	62.77	2722.14	26.00	54.56	17.33	0.91	0.00	16.67	83.33	41.42	1.05	1.30	0.89	1.03	1.66

DS: Disease severity, MR: Mean rank.

Supplementary Table 3 (Continued).

	CI	MR	S1	S2	S3	S4	S5	S6	Top	Mid	Low	NP1	NP2	NP3	NP4	NS1	NS2
G57	29.50	66.92	66.90	3050.54	160.90	91.84	33.22	3.80	66.67	16.67	16.67	40.25	0.37	0.51	1.00	0.72	0.95
G58	18.67	56.67	57.27	2621.90	127.98	106.62	35.83	2.42	16.67	33.33	50.00	38.67	0.69	0.75	1.01	1.19	2.39
G59	50.83	79.00	76.40	4067.60	208.08	63.56	20.56	6.35	83.33	16.67	0.00	53.33	0.37	0.44	0.97	0.23	0.50
G60	46.50	84.83	68.07	3497.37	334.51	92.21	27.53	6.50	83.33	0.00	16.67	41.83	0.29	0.43	0.80	0.30	0.74
G61	3.00	80.50	35.33	868.80	0.63	9.43	3.00	0.13	0.00	0.00	100.00	20.67	1.97	2.63	0.44	0.68	1.14
G62	23.67	80.67	65.67	3138.80	163.96	104.81	38.33	3.43	50.00	16.67	33.33	48.67	0.50	0.61	0.81	0.84	1.21
G63	14.83	74.33	42.80	1331.44	56.25	72.33	23.67	1.53	0.00	50.00	50.00	26.25	0.51	0.57	0.57	1.00	1.75
G64	17.33	72.75	41.03	1165.98	44.36	59.51	20.33	1.53	16.67	50.00	33.33	26.42	0.42	0.44	0.57	0.71	1.07
G65	16.33	57.33	68.60	3344.77	116.18	107.38	37.50	2.27	16.67	16.67	66.67	44.75	1.54	1.02	1.21	2.46	4.36
G66	29.67	88.25	63.17	2771.58	280.40	105.46	31.94	4.83	83.33	0.00	16.67	40.92	0.31	0.43	0.72	0.30	0.91
G67	12.00	81.42	19.03	266.44	2.49	16.16	5.50	0.31	0.00	16.67	83.33	11.25	0.24	0.32	0.23	0.24	0.43
G68	15.00	77.17	21.47	327.07	7.82	26.70	9.94	0.65	0.00	66.67	33.33	15.83	0.29	0.28	0.28	0.44	0.49
G69	27.00	77.17	44.67	1395.97	75.98	59.07	17.22	2.25	83.33	16.67	0.00	25.83	0.23	0.32	0.58	0.27	0.73
G70	23.33	78.58	31.77	739.38	16.04	29.61	9.33	1.02	33.33	66.67	0.00	17.58	0.18	0.26	0.40	0.20	0.38
G71	35.17	78.00	78.27	4787.20	164.19	74.07	27.06	4.86	66.67	33.33	0.00	63.08	0.48	0.54	1.01	0.44	0.63
G72	30.83	82.00	60.87	2644.90	107.81	61.94	20.61	3.48	83.33	16.67	0.00	44.92	0.35	0.41	0.74	0.28	0.57
G73	42.17	83.17	77.53	4132.57	177.83	59.64	17.83	5.35	83.33	16.67	0.00	55.67	0.39	0.45	0.93	0.20	0.48
G74	33.50	87.08	65.97	3389.74	147.89	71.77	26.94	4.64	66.67	33.33	0.00	41.08	0.32	0.46	0.76	0.49	0.58
G75	26.33	81.50	56.73	2303.30	107.98	72.37	22.33	2.76	66.67	16.67	16.67	40.50	0.36	0.43	0.70	0.36	0.76
G76	54.33	77.83	83.93	5439.94	58.34	24.55	8.44	4.90	100.00	0.00	0.00	66.75	0.46	0.48	1.08	0.12	0.19
G77	52.67	89.33	79.33	4820.18	96.39	36.41	14.00	6.11	100.00	0.00	0.00	56.08	0.38	0.46	0.89	0.22	0.22
G78	34.00	78.17	83.73	5122.67	330.47	133.59	48.33	5.37	50.00	16.67	33.33	64.33	0.53	0.67	1.07	0.94	1.15
G79	41.00	80.00	75.87	4045.20	196.09	79.93	30.28	5.58	66.67	33.33	0.00	51.67	0.37	0.49	0.95	0.46	0.60
G80	21.50	80.50	67.47	3104.80	126.60	93.18	33.78	2.96	33.33	33.33	33.33	48.33	0.52	0.62	0.84	0.97	1.00
G81	20.83	74.00	29.53	597.30	26.04	40.05	14.42	1.40	16.67	83.33	0.00	18.83	0.22	0.25	0.40	0.34	0.52
G82	16.83	83.08	32.03	749.87	28.91	48.29	16.06	1.19	0.00	83.33	16.67	18.33	0.25	0.36	0.39	0.47	0.83
G83	33.67	70.33	59.33	2446.47	41.53	33.74	12.44	2.72	100.00	0.00	0.00	40.83	0.35	0.37	0.86	0.27	0.28
G84	26.67	83.08	28.43	643.67	22.11	30.62	8.75	1.24	83.33	16.67	0.00	16.25	0.15	0.21	0.34	0.14	0.39
G85	19.50	69.33	69.00	3235.37	91.35	82.82	31.92	2.55	33.33	16.67	50.00	49.33	0.71	0.68	1.00	1.03	1.25
G86	27.00	76.00	58.73	2395.40	140.29	85.34	24.39	2.82	66.67	16.67	16.67	34.67	0.32	0.45	0.77	0.36	1.06
G87	20.33	72.50	51.60	2025.77	71.72	73.26	24.06	1.93	33.33	50.00	16.67	30.75	0.41	0.54	0.71	0.84	1.16
G88	34.83	76.17	64.47	2942.57	41.28	32.39	11.89	2.81	100.00	0.00	0.00	45.75	0.35	0.39	0.85	0.23	0.25
G89	22.83	71.42	37.57	1139.44	47.72	54.58	15.81	1.52	16.67	83.33	0.00	21.08	0.25	0.35	0.53	0.28	0.84
G90	16.50	79.42	45.50	1395.14	43.83	62.45	21.67	1.46	0.00	66.67	33.33	30.25	0.50	0.55	0.57	1.03	1.05
G91	16.17	67.08	40.23	1335.30	48.14	64.96	19.78	1.35	16.67	16.67	66.67	25.25	0.51	0.53	0.60	0.62	1.53
G92	6.00	73.25	35.17	862.98	8.86	33.89	13.25	0.61	0.00	0.00	100.00	21.92	1.07	1.25	0.48	1.26	1.83
G93	15.17	75.75	32.17	768.27	26.23	47.95	18.11	1.24	0.00	33.33	66.67	21.83	0.44	0.40	0.42	0.76	0.95
G94	18.33	77.83	50.60	1726.04	74.17	74.00	24.39	1.98	16.67	50.00	33.33	29.25	0.39	0.49	0.65	0.81	1.22
G95	15.67	73.58	31.97	688.64	29.45	51.32	17.58	1.18	0.00	50.00	50.00	22.92	0.41	0.39	0.43	0.67	1.14
G96	9.17	67.42	69.03	3600.44	66.78	86.77	30.08	1.60	16.67	16.67	66.67	54.42	2.03	1.44	1.02	2.26	3.78
G97	9.33	77.75	52.03	1891.07	30.68	59.81	22.22	1.14	0.00	33.33	66.67	32.17	1.29	1.16	0.67	2.18	2.52
G98	22.00	82.25	25.30	661.18	54.04	57.61	16.19	1.58	16.67	66.67	16.67	13.25	0.14	0.26	0.31	0.22	0.83
G99	37.50	86.17	64.80	3098.67	100.66	49.58	18.22	4.48	83.33	16.67	0.00	42.00	0.30	0.40	0.75	0.27	0.38
G100	3.17	64.83	55.87	2285.47	66.47	92.15	27.58	1.30	16.67	0.00	83.33	38.00	10.86	1.87	0.86	11.46	29.57
G101	4.17	82.33	37.07	982.18	3.37	21.53	7.61	0.33	0.00	0.00	100.00	26.00	2.17	2.11	0.45	1.76	1.79
G102	18.50	76.00	21.47	329.80	18.12	37.57	10.56	0.81	0.00	83.33	16.67	12.33	0.17	0.23	0.28	0.27	0.68
G103	38.33	91.92	76.63	4828.64	384.22	118.42	39.50	6.49	66.67	16.67	16.67	50.17	0.35	0.55	0.83	0.48	0.93
G104	17.50	54.50	45.33	2204.20	115.59	104.97	30.06	1.89	16.67	16.67	66.67	25.00	0.51	0.77	0.83	1.22	2.65
G105	20.17	70.58	52.43	1980.04	108.67	92.46	29.39	2.24	16.67	50.00	33.33	31.25	0.42	0.56	0.74	0.93	1.60
G106	20.17	83.50	45.33	1666.60	91.36	83.51	30.94	2.43	16.67	50.00	33.33	27.50	0.29	0.50	0.54	0.69	0.97
G107	23.50	85.08	50.23	1773.14	140.30	92.57	31.94	3.14	66.67	16.67	16.67	32.25	0.29	0.43	0.59	0.55	0.96
G108	21.00	80.92	64.03	3003.54	131.03	97.91	35.17	2.88	50.00	16.67	33.33	48.92	0.55	0.64	0.79	0.96	1.16
G109	19.50	81.92	32.97	779.74	48.59	60.13	20.72	1.67	0.00	83.33	16.67	21.58	0.24	0.33	0.40	0.46	0.78
G110	21.17	83.83	26.60	731.67	55.91	60.86	17.50	1.58	16.67	66.67	16.67	15.00	0.16	0.29	0.32	0.30	0.88
G111	14.33	68.00	57.93	2274.34	32.26	57.30	21.00	1.24	0.00	33.33	66.67	36.50	0.87	0.89	0.85	1.29	1.39
G112	18.33	65.83	57.67	2340.67	56.60	69.09	23.72	1.69	16.67	33.33	50.00	36.33	0.63	0.66	0.88	0.88	1.48

DS: Disease severity, MR: Mean rank.

Supplementary Table 3. Nonparametric stability statistics for coefficient of infection (CI).

	CI	MR	S1	S2	S3	S4	S5	S6	Top	Mid	Low	NP1	NP2	NP3	NP4	NS1	NS2
G113	19.33	61.67	76.00	4206.17	169.86	120.51	45.67	3.20	33.33	0.00	66.67	49.50	1.32	0.90	1.23	2.89	2.93
G114	14.50	69.42	58.77	2436.84	36.29	59.43	21.00	1.29	0.00	50.00	50.00	35.58	0.67	0.84	0.85	1.04	1.23
G115	16.50	72.33	32.40	738.47	19.38	40.92	12.58	0.87	0.00	66.67	33.33	21.00	0.34	0.38	0.45	0.43	0.80
G116	16.00	74.33	32.73	741.57	17.40	38.91	15.00	1.03	0.00	50.00	50.00	23.17	0.38	0.39	0.44	0.50	0.68
G117	23.17	64.17	53.07	2031.40	56.31	56.99	19.33	2.01	33.33	66.67	0.00	32.92	0.39	0.44	0.83	0.46	0.76
G118	20.50	82.92	31.77	726.44	13.22	30.40	11.58	0.99	0.00	100.00	0.00	22.42	0.27	0.30	0.38	0.34	0.35
G119	20.50	72.33	42.07	1431.97	44.87	56.21	20.28	1.73	33.33	66.67	0.00	25.50	0.34	0.43	0.58	0.70	0.81
G120	17.17	71.25	52.23	1989.48	49.84	66.04	23.83	1.63	16.67	33.33	50.00	37.42	0.59	0.64	0.73	0.70	1.30
G121	16.50	71.00	36.27	909.20	25.08	46.91	15.92	1.09	0.00	50.00	50.00	23.67	0.41	0.44	0.51	0.55	0.99
G122	29.17	44.25	51.83	2826.64	71.92	63.56	17.72	1.89	16.67	83.33	0.00	29.58	0.33	0.51	1.17	0.32	0.94
G123	19.00	76.58	26.70	606.14	14.86	33.70	10.28	0.81	0.00	100.00	0.00	15.08	0.20	0.30	0.35	0.33	0.58
G124	11.33	64.50	76.33	4298.30	134.43	117.48	44.61	2.61	33.33	0.00	66.67	57.67	2.78	1.23	1.18	5.02	5.33
G125	13.67	68.33	54.20	1917.28	43.08	65.08	22.39	1.37	0.00	33.33	66.67	35.75	0.76	0.76	0.79	1.17	1.59
G126	19.83	77.08	32.57	812.24	46.05	55.82	20.61	1.83	33.33	66.67	0.00	20.92	0.28	0.31	0.42	0.65	0.83
G127	32.33	61.33	53.33	2195.47	34.47	31.57	10.78	2.24	100.00	0.00	0.00	33.00	0.28	0.35	0.86	0.20	0.31
G128	22.50	64.42	49.50	1878.54	60.90	62.63	19.28	1.80	16.67	83.33	0.00	30.25	0.40	0.46	0.77	0.41	1.03
G129	25.67	83.75	53.10	2108.68	126.81	83.58	30.61	3.33	66.67	16.67	16.67	32.25	0.29	0.44	0.63	0.62	0.87
G130	23.50	71.08	46.23	1798.64	136.05	92.76	28.00	2.66	33.33	50.00	16.67	24.08	0.26	0.44	0.65	0.57	1.34
G131	19.83	72.33	47.47	1592.60	71.67	74.85	23.56	1.81	16.67	50.00	33.33	28.08	0.38	0.50	0.66	0.73	1.31
G132	22.17	68.08	56.63	2611.14	87.75	76.72	25.72	2.30	33.33	50.00	16.67	36.42	0.48	0.56	0.83	0.73	1.27
G133	23.50	62.42	59.57	2712.64	66.59	62.68	23.17	2.36	33.33	66.67	0.00	36.42	0.48	0.52	0.95	0.62	0.87
G134	16.83	70.00	41.00	1146.30	41.12	60.24	19.42	1.32	16.67	33.33	50.00	27.00	0.47	0.49	0.59	0.63	1.37
G135	8.33	75.08	59.23	2318.70	79.70	94.55	30.28	1.62	16.67	0.00	83.33	34.92	1.40	1.13	0.79	2.32	4.60
G136	3.33	78.83	47.67	1530.84	2.61	19.13	5.78	0.25	0.00	0.00	100.00	27.67	2.63	3.29	0.60	1.26	2.33
G137	10.33	83.58	42.17	1191.04	30.80	57.88	19.58	1.08	0.00	16.67	83.33	29.42	0.74	0.75	0.50	0.93	1.85
G138	8.00	83.50	54.47	2102.50	27.03	56.63	22.33	1.13	0.00	16.67	83.33	35.83	1.14	1.29	0.65	1.37	1.94
G139	5.67	69.75	52.17	1964.34	62.07	87.20	26.33	1.29	16.67	0.00	83.33	31.58	2.63	1.42	0.75	2.77	8.33
G140	3.00	80.92	40.30	1096.04	0.85	10.96	3.89	0.17	0.00	0.00	100.00	24.08	2.29	3.15	0.50	0.96	1.14
G141	7.17	80.08	44.90	1413.54	32.56	62.73	18.78	0.93	0.00	16.67	83.33	25.58	1.26	1.14	0.56	1.25	3.60
G142	9.67	78.17	35.13	869.18	14.39	41.17	14.22	0.72	0.00	16.67	83.33	22.25	0.86	0.81	0.45	1.05	2.00
G143	6.83	71.67	50.73	1814.28	16.33	45.95	13.78	0.64	0.00	16.67	83.33	37.50	2.88	1.80	0.71	1.56	4.04
G144	7.17	81.33	32.73	811.17	2.15	16.54	5.94	0.28	0.00	0.00	100.00	17.67	0.71	1.11	0.40	0.63	0.70
G145	13.00	83.58	47.77	1603.24	60.39	76.21	27.17	1.69	0.00	66.67	33.33	33.08	0.51	0.67	0.57	1.01	1.30
G146	7.00	83.25	38.23	1029.38	4.10	22.78	6.39	0.30	0.00	0.00	100.00	23.92	0.96	1.20	0.46	0.48	1.26
G147	11.00	76.50	62.80	2704.20	73.56	89.34	34.33	1.90	0.00	33.33	66.67	39.50	2.08	1.12	0.82	4.16	4.24
G148	8.33	75.67	38.93	1071.87	7.84	31.33	11.78	0.56	0.00	0.00	100.00	27.58	1.43	1.14	0.51	1.45	1.58
G149	9.67	83.83	35.00	936.84	2.79	18.04	5.17	0.27	0.00	0.00	100.00	19.75	0.57	0.81	0.42	0.32	0.67
G150	3.00	72.75	47.90	1687.58	4.00	23.40	7.42	0.32	0.00	0.00	100.00	31.08	2.49	2.69	0.66	1.19	2.24

DS: Disease severity, MR: Mean rank.

Supplementary Table 4. Nonparametric stability statistics for infection type (IT).

	IT	MR	S1	S2	S3	S4	S5	S6	Top	Mid	Low	NP1	NP2	NP3	NP4	NS1	NS2
G1	1.67	69.33	52.87	2130.07	43.59	71.79	28.89	1.25	0.00	16.67	83.33	29.17	1.69	1.26	0.72	2.65	4.87
G2	1.00	78.33	28.07	689.17	7.32	30.95	16.89	0.42	0.00	0.00	100.00	14.33	0.86	1.19	0.36	0.72	2.36
G3	2.00	65.08	42.77	1329.74	14.73	41.54	22.25	0.86	0.00	16.67	83.33	32.58	1.00	0.98	0.66	1.05	1.17
G4	3.00	78.33	28.07	689.17	31.00	54.43	16.83	0.95	16.67	50.00	33.33	14.33	0.27	0.43	0.36	0.50	1.38
G5	6.67	85.33	37.73	1374.80	133.60	70.78	29.39	3.39	83.33	0.00	16.67	19.33	0.15	0.30	0.43	0.26	0.66
G6	3.33	81.75	60.90	2673.27	45.29	64.55	32.00	1.45	0.00	50.00	50.00	36.58	0.70	0.80	0.74	1.00	1.44
G7	4.33	83.42	54.83	2340.24	69.39	70.77	13.72	2.07	16.67	66.67	16.67	33.58	0.37	0.55	0.66	0.56	0.97
G8	1.00	78.33	28.07	689.17	7.32	30.95	11.50	0.42	0.00	0.00	100.00	14.33	0.86	1.19	0.36	0.72	2.36
G9	3.67	83.67	63.67	2982.57	56.90	69.98	8.25	1.85	0.00	50.00	50.00	46.08	0.66	0.75	0.77	0.74	1.07
G10	4.67	77.25	46.37	1560.40	47.08	56.82	20.89	1.76	16.67	66.67	16.67	27.33	0.30	0.43	0.59	0.50	0.73
G11	3.67	91.92	68.97	4220.47	126.79	102.12	29.78	2.80	16.67	50.00	33.33	43.75	0.48	0.85	0.75	0.95	1.20
G12	5.33	76.92	42.90	1311.84	50.99	54.50	30.00	1.63	33.33	50.00	16.67	24.42	0.26	0.36	0.56	0.40	0.72
G13	3.33	84.75	76.57	4346.94	111.73	99.53	23.42	2.57	16.67	33.33	50.00	58.25	0.84	0.97	0.90	1.20	1.56
G14	2.00	58.83	54.40	2499.47	74.42	92.04	21.83	1.58	16.67	0.00	83.33	31.50	1.83	1.23	0.92	2.92	6.29
G15	1.33	73.58	15.03	262.57	6.35	28.45	24.75	0.45	0.00	0.00	100.00	7.92	0.46	0.65	0.20	1.00	1.91
G16	4.00	93.08	46.23	2029.14	84.39	78.08	26.75	1.96	16.67	66.67	16.67	26.08	0.29	0.52	0.50	0.28	1.02
G17	4.33	85.42	53.97	2233.54	90.30	82.43	22.75	2.31	16.67	50.00	33.33	32.00	0.35	0.57	0.64	0.63	1.13
G18	4.00	86.92	63.17	3228.14	105.13	91.04	32.06	2.57	16.67	50.00	33.33	39.25	0.43	0.72	0.73	0.81	1.13
G19	3.67	86.67	58.40	2599.07	45.15	61.46	19.25	1.71	0.00	66.67	33.33	45.00	0.63	0.68	0.69	0.69	0.89
G20	2.67	63.33	73.53	4358.47	94.45	99.11	30.58	2.14	16.67	16.67	66.67	49.33	2.17	1.29	1.18	3.51	4.48
G21	2.67	63.33	73.53	4358.47	94.45	99.11	30.42	2.14	16.67	16.67	66.67	49.33	2.17	1.29	1.18	3.51	4.48
G22	2.67	63.33	73.53	4358.47	94.45	99.11	25.08	2.14	16.67	16.67	66.67	49.33	2.17	1.29	1.18	3.51	4.48
G23	2.00	60.17	47.27	1941.87	28.01	57.77	7.67	1.04	0.00	16.67	83.33	27.67	1.60	1.26	0.79	2.27	3.68
G24	4.33	63.92	58.50	2428.44	43.44	57.90	21.33	1.61	16.67	83.33	0.00	43.25	0.65	0.61	0.92	0.65	0.97
G25	4.33	79.00	45.33	1548.80	26.18	44.44	26.17	1.30	0.00	83.33	16.67	29.33	0.35	0.47	0.57	0.47	0.54
G26	1.33	73.58	15.03	262.57	6.35	28.45	14.75	0.45	0.00	0.00	100.00	7.92	0.46	0.65	0.20	1.00	1.91
G27	3.33	76.75	26.83	888.54	12.94	34.75	30.42	0.67	0.00	66.67	33.33	13.75	0.26	0.46	0.35	0.26	0.79
G28	4.33	79.00	45.33	1548.80	26.18	44.44	16.94	1.30	0.00	83.33	16.67	29.33	0.35	0.47	0.57	0.47	0.54
G29	3.00	80.58	39.23	1240.44	19.84	43.85	24.67	0.73	0.00	66.67	33.33	20.75	0.40	0.59	0.49	0.39	1.15
G30	5.67	77.50	85.60	5751.34	273.86	127.56	27.25	5.23	50.00	0.00	50.00	68.75	0.73	0.75	1.09	1.10	1.22
G31	4.00	67.08	52.50	2118.34	46.10	61.42	41.50	1.64	16.67	66.67	16.67	33.75	0.63	0.61	0.78	0.83	1.24
G32	3.67	72.33	48.53	1757.54	71.00	77.80	25.22	2.02	33.33	33.33	33.33	28.17	0.54	0.59	0.70	1.24	1.68
G33	4.67	55.00	63.33	2978.80	97.81	84.36	26.00	2.38	33.33	50.00	16.67	43.25	0.66	0.63	1.12	0.94	1.50
G34	6.00	86.92	63.17	3228.14	163.93	88.55	28.67	4.26	66.67	16.67	16.67	39.25	0.31	0.50	0.73	0.63	0.66
G35	3.67	74.25	37.50	1223.94	16.15	37.84	20.33	0.95	0.00	83.33	16.67	23.50	0.44	0.52	0.53	0.56	0.77
G36	3.00	80.58	39.23	1240.44	19.84	43.85	39.58	0.73	0.00	66.67	33.33	20.75	0.40	0.59	0.49	0.39	1.15
G37	7.33	98.50	63.47	3157.84	337.97	101.53	23.58	6.03	83.33	0.00	16.67	39.67	0.29	0.42	0.64	0.28	0.84
G38	5.67	70.17	36.27	980.77	22.95	35.07	15.56	1.42	33.33	66.67	0.00	20.83	0.23	0.28	0.47	0.33	0.42
G39	5.67	82.25	65.70	2900.54	98.03	71.97	23.28	2.83	66.67	16.67	16.67	46.08	0.42	0.50	0.77	0.51	0.75
G40	3.67	83.67	63.67	2982.57	56.90	69.98	13.00	1.85	0.00	50.00	50.00	46.08	0.66	0.75	0.77	0.74	1.07
G41	3.33	81.75	60.90	2673.27	45.29	64.55	28.53	1.45	0.00	50.00	50.00	36.58	0.70	0.80	0.74	1.00	1.44
G42	4.33	79.00	45.33	1548.80	26.18	44.44	22.83	1.30	0.00	83.33	16.67	29.33	0.35	0.47	0.57	0.47	0.54
G43	5.00	77.58	34.23	1036.44	48.02	54.49	40.75	1.35	16.67	66.67	16.67	17.42	0.19	0.33	0.44	0.24	0.84
G44	6.00	81.92	56.43	2392.94	104.39	69.67	25.67	3.12	66.67	16.67	16.67	35.58	0.30	0.43	0.69	0.39	0.64
G45	5.33	77.42	47.50	1634.17	62.68	59.99	27.28	1.86	33.33	50.00	16.67	27.42	0.30	0.39	0.61	0.43	0.83
G46	5.67	67.83	55.27	2144.77	99.86	72.87	43.61	2.65	33.33	50.00	16.67	31.42	0.34	0.43	0.77	0.54	1.02
G47	2.00	60.17	47.27	1941.87	28.01	57.77	23.94	1.04	0.00	16.67	83.33	27.67	1.60	1.26	0.79	2.27	3.68
G48	4.67	81.25	43.43	1657.18	85.10	77.50	24.72	1.94	16.67	66.67	16.67	23.75	0.26	0.47	0.54	0.40	1.13
G49	3.33	80.92	73.63	3758.88	67.90	79.89	28.75	1.95	0.00	50.00	50.00	53.33	0.85	0.98	0.91	1.20	1.24
G50	6.33	85.42	53.97	2233.54	127.82	74.28	23.00	3.85	66.67	33.33	0.00	32.00	0.26	0.40	0.64	0.48	0.63
G51	4.00	65.08	42.77	1329.74	33.64	52.34	33.67	1.48	16.67	66.67	16.67	32.58	0.50	0.48	0.66	0.65	0.88
G52	6.67	84.83	81.47	4801.07	271.79	108.73	15.36	5.70	66.67	0.00	33.33	57.50	0.43	0.59	0.96	0.73	0.76
G53	6.67	58.75	66.10	3106.90	74.74	53.58	33.33	3.29	50.00	50.00	0.00	46.17	0.43	0.45	1.09	0.41	0.50
G54	3.33	85.08	71.70	3574.54	66.07	76.97	24.56	2.02	0.00	50.00	50.00	53.08	0.77	0.90	0.84	0.97	1.09
G55	4.67	68.92	63.37	2710.44	78.63	76.11	32.67	2.28	16.67	50.00	33.33	43.92	0.60	0.62	0.90	0.74	1.20
G56	6.00	81.92	56.43	2392.94	104.39	69.67	19.33	3.12	66.67	16.67	16.67	35.58	0.30	0.43	0.69	0.39	0.64

DS: Disease severity, MR: Mean rank.

Supplementary Table 4 (Continued).

	IT	MR	S1	S2	S3	S4	S5	S6	Top	Mid	Low	NP1	NP2	NP3	NP4	NS1	NS2
G57	2.67	87.00	49.20	1918.57	33.11	57.64	40.28	0.91	0.00	66.67	33.33	26.92	0.51	0.78	0.57	0.49	1.54
G58	3.67	71.08	57.37	2374.54	133.08	105.99	33.28	2.60	33.33	33.33	33.33	32.50	0.62	0.68	0.84	1.46	2.55
G59	2.67	82.08	71.43	3515.08	64.58	79.96	27.53	1.68	0.00	50.00	50.00	47.83	0.94	1.04	0.88	1.51	1.66
G60	3.33	84.75	76.57	4346.94	111.73	99.53	12.69	2.57	16.67	33.33	50.00	58.25	0.84	0.97	0.90	1.20	1.56
G61	9.00	78.33	28.07	689.17	32.28	18.34	2.67	3.18	100.00	0.00	0.00	14.33	0.10	0.17	0.36	0.05	0.15
G62	5.67	67.83	55.27	2144.77	99.86	72.87	35.92	2.65	33.33	50.00	16.67	31.42	0.34	0.43	0.77	0.54	1.02
G63	6.33	86.00	81.67	4823.10	295.42	118.98	16.06	5.60	66.67	0.00	33.33	58.42	0.45	0.62	0.95	0.81	0.89
G64	3.00	80.58	39.23	1240.44	19.84	43.85	19.00	0.73	0.00	66.67	33.33	20.75	0.40	0.59	0.49	0.39	1.15
G65	6.33	78.50	63.93	2901.20	142.20	77.51	29.83	3.83	66.67	16.67	16.67	40.75	0.33	0.45	0.82	0.41	0.76
G66	1.67	66.33	31.87	770.68	11.35	37.49	27.28	0.70	0.00	0.00	100.00	18.00	1.04	0.91	0.42	1.86	2.06
G67	4.33	57.17	59.60	3126.67	84.87	80.88	9.61	2.40	33.33	50.00	16.67	38.08	0.71	0.69	1.06	1.27	1.50
G68	3.67	74.25	37.50	1223.94	16.15	37.84	21.75	0.95	0.00	83.33	16.67	23.50	0.44	0.52	0.53	0.56	0.77
G69	4.67	80.92	26.63	694.64	21.99	39.09	10.44	1.08	0.00	83.33	16.67	15.00	0.17	0.30	0.33	0.24	0.50
G70	4.67	80.92	26.63	694.64	21.99	39.09	4.39	1.08	0.00	83.33	16.67	15.00	0.17	0.30	0.33	0.24	0.50
G71	2.00	60.17	47.27	1941.87	28.01	57.77	17.25	1.04	0.00	16.67	83.33	27.67	1.60	1.26	0.79	2.27	3.68
G72	1.33	73.58	15.03	262.57	6.35	28.45	23.28	0.45	0.00	0.00	100.00	7.92	0.46	0.65	0.20	1.00	1.91
G73	1.67	66.33	31.87	770.68	11.35	37.49	11.83	0.70	0.00	0.00	100.00	18.00	1.04	0.91	0.42	1.86	2.06
G74	2.00	60.17	47.27	1941.87	28.01	57.77	15.06	1.04	0.00	16.67	83.33	27.67	1.60	1.26	0.79	2.27	3.68
G75	3.33	70.42	73.57	3694.84	95.17	94.04	30.72	2.08	16.67	33.33	50.00	46.42	0.91	0.96	1.04	1.59	2.11
G76	1.67	66.33	31.87	770.68	11.35	37.49	9.11	0.70	0.00	0.00	100.00	18.00	1.04	0.91	0.42	1.86	2.06
G77	1.33	73.58	15.03	262.57	6.35	28.45	23.06	0.45	0.00	0.00	100.00	7.92	0.46	0.65	0.20	1.00	1.91
G78	4.33	70.00	78.27	4213.60	186.33	120.81	48.22	3.50	33.33	16.67	50.00	56.83	0.83	0.81	1.12	1.64	1.84
G79	2.00	60.17	47.27	1941.87	28.01	57.77	25.83	1.04	0.00	16.67	83.33	27.67	1.60	1.26	0.79	2.27	3.68
G80	3.33	70.42	73.57	3694.84	95.17	94.04	36.83	2.08	16.67	33.33	50.00	46.42	0.91	0.96	1.04	1.59	2.11
G81	2.00	62.42	47.90	1817.94	36.47	64.71	18.06	1.13	0.00	16.67	83.33	29.92	1.30	1.08	0.77	1.79	3.20
G82	2.33	59.08	59.30	2491.40	29.20	57.31	14.22	1.15	0.00	33.33	66.67	41.83	1.29	1.16	0.96	1.34	1.89
G83	1.00	78.33	28.07	689.17	7.32	30.95	8.94	0.42	0.00	0.00	100.00	14.33	0.86	1.19	0.36	0.72	2.36
G84	2.00	60.17	47.27	1941.87	28.01	57.77	5.50	1.04	0.00	16.67	83.33	27.67	1.60	1.26	0.79	2.27	3.68
G85	5.00	77.58	34.23	1036.44	48.02	54.49	20.42	1.35	16.67	66.67	16.67	17.42	0.19	0.33	0.44	0.24	0.84
G86	4.00	65.25	52.70	2339.18	57.24	68.09	32.56	1.80	16.67	66.67	16.67	31.92	0.59	0.63	0.81	0.87	1.42
G87	4.00	65.25	52.70	2339.18	57.24	68.09	35.61	1.80	16.67	66.67	16.67	31.92	0.59	0.63	0.81	0.87	1.42
G88	1.33	73.58	15.03	262.57	6.35	28.45	18.56	0.45	0.00	0.00	100.00	7.92	0.46	0.65	0.20	1.00	1.91
G89	2.33	59.08	59.30	2491.40	29.20	57.31	23.75	1.15	0.00	33.33	66.67	41.83	1.29	1.16	0.96	1.34	1.89
G90	4.33	59.92	56.83	2344.94	57.23	66.38	21.17	1.91	33.33	50.00	16.67	40.75	0.62	0.60	0.97	0.84	1.11
G91	4.00	60.17	47.27	1941.87	68.06	73.63	8.00	2.07	33.33	50.00	16.67	27.67	0.51	0.56	0.79	1.06	1.50
G92	7.67	85.83	60.07	2442.30	71.76	37.57	12.00	3.83	100.00	0.00	0.00	43.42	0.32	0.35	0.69	0.19	0.31
G93	4.33	57.17	59.60	3126.67	84.87	80.88	14.67	2.40	33.33	50.00	16.67	38.08	0.71	0.69	1.06	1.27	1.50
G94	3.67	71.25	55.03	2183.08	93.84	90.01	25.56	2.22	33.33	33.33	33.33	31.33	0.60	0.67	0.81	1.34	2.09
G95	4.67	75.58	50.77	1864.04	58.46	62.93	14.83	1.90	16.67	66.67	16.67	30.50	0.34	0.47	0.66	0.53	0.85
G96	7.67	71.25	55.43	2266.94	105.34	54.95	26.06	3.50	83.33	16.67	0.00	32.42	0.26	0.35	0.73	0.30	0.54
G97	5.67	67.50	79.13	4454.87	172.35	99.62	13.22	4.19	50.00	50.00	0.00	60.67	0.68	0.66	1.17	0.93	1.03
G98	5.00	77.58	34.23	1036.44	48.02	54.49	16.75	1.35	16.67	66.67	16.67	17.42	0.19	0.33	0.44	0.24	0.84
G99	2.00	60.17	47.27	1941.87	28.01	57.77	10.44	1.04	0.00	16.67	83.33	27.67	1.60	1.26	0.79	2.27	3.68
G100	8.00	100.58	47.77	2456.94	421.67	105.37	17.08	7.30	83.33	0.00	16.67	25.58	0.18	0.36	0.47	0.21	0.81
G101	9.00	78.33	28.07	689.17	32.28	18.34	13.00	3.18	100.00	0.00	0.00	14.33	0.10	0.17	0.36	0.05	0.15
G102	4.33	66.08	60.03	2491.04	46.77	60.53	24.75	1.67	16.67	66.67	16.67	43.25	0.66	0.63	0.92	0.69	1.05
G103	3.33	70.42	73.57	3694.84	95.17	94.04	47.17	2.08	16.67	33.33	50.00	46.42	0.91	0.96	1.04	1.59	2.11
G104	6.00	81.92	56.43	2392.94	104.39	69.67	24.11	3.12	66.67	16.67	16.67	35.58	0.30	0.43	0.69	0.39	0.64
G105	6.00	81.92	56.43	2392.94	104.39	69.67	25.25	3.12	66.67	16.67	16.67	35.58	0.30	0.43	0.69	0.39	0.64
G106	6.00	81.92	56.43	2392.94	104.39	69.67	21.67	3.12	66.67	16.67	16.67	35.58	0.30	0.43	0.69	0.39	0.64
G107	5.00	77.58	34.23	1036.44	48.02	54.49	30.67	1.35	16.67	66.67	16.67	17.42	0.19	0.33	0.44	0.24	0.84
G108	4.00	65.25	52.70	2339.18	57.24	68.09	17.83	1.80	16.67	66.67	16.67	31.92	0.59	0.63	0.81	0.87	1.42
G109	4.00	65.25	52.70	2339.18	57.24	68.09	15.50	1.80	16.67	66.67	16.67	31.92	0.59	0.63	0.81	0.87	1.42
G110	5.00	77.58	34.23	1036.44	48.02	54.49	18.39	1.35	16.67	66.67	16.67	17.42	0.19	0.33	0.44	0.24	0.84
G111	6.00	81.92	56.43	2392.94	104.39	69.67	15.83	3.12	66.67	16.67	16.67	35.58	0.30	0.43	0.69	0.39	0.64
G112	5.67	85.83	60.07	2442.30	89.05	69.45	12.33	2.81	50.00	33.33	16.67	43.42	0.42	0.47	0.69	0.53	0.75

DS: Disease severity, MR: Mean rank.

Supplementary Table 4 (Continued).

	IT	MR	S1	S2	S3	S4	S5	S6	Top	Mid	Low	NP1	NP2	NP3	NP4	NS1	NS2
G113	6.00	81.92	56.43	2392.94	104.39	69.67	30.89	3.12	66.67	16.67	16.67	35.58	0.30	0.43	0.69	0.39	0.64
G114	3.67	74.25	37.50	1223.94	16.15	37.84	28.17	0.95	0.00	83.33	16.67	23.50	0.44	0.52	0.53	0.56	0.77
G115	3.00	80.58	39.23	1240.44	19.84	43.85	19.25	0.73	0.00	66.67	33.33	20.75	0.40	0.59	0.49	0.39	1.15
G116	3.67	74.25	37.50	1223.94	16.15	37.84	26.17	0.95	0.00	83.33	16.67	23.50	0.44	0.52	0.53	0.56	0.77
G117	4.67	80.92	26.63	694.64	21.99	39.09	10.94	1.08	0.00	83.33	16.67	15.00	0.17	0.30	0.33	0.24	0.50
G118	3.67	74.25	37.50	1223.94	16.15	37.84	22.33	0.95	0.00	83.33	16.67	23.50	0.44	0.52	0.53	0.56	0.77
G119	3.00	80.58	39.23	1240.44	19.84	43.85	25.42	0.73	0.00	66.67	33.33	20.75	0.40	0.59	0.49	0.39	1.15
G120	5.67	85.83	60.07	2442.30	89.05	69.45	14.39	2.81	50.00	33.33	16.67	43.42	0.42	0.47	0.69	0.53	0.75
G121	5.67	85.83	60.07	2442.30	89.05	69.45	14.58	2.81	50.00	33.33	16.67	43.42	0.42	0.47	0.69	0.53	0.75
G122	2.67	87.00	49.20	1918.57	33.11	57.64	27.11	0.91	0.00	66.67	33.33	26.92	0.51	0.78	0.57	0.49	1.54
G123	3.67	74.25	37.50	1223.94	16.15	37.84	30.00	0.95	0.00	83.33	16.67	23.50	0.44	0.52	0.53	0.56	0.77
G124	6.67	87.92	49.23	2118.17	225.53	93.78	22.33	4.28	83.33	0.00	16.67	25.33	0.20	0.38	0.56	0.33	0.92
G125	6.00	82.42	54.90	2201.54	108.80	73.94	20.44	3.18	66.67	16.67	16.67	35.08	0.30	0.43	0.67	0.48	0.70
G126	4.67	80.92	26.63	694.64	21.99	39.09	13.94	1.08	0.00	83.33	16.67	15.00	0.17	0.30	0.33	0.24	0.50
G127	3.67	83.67	63.67	2982.57	56.90	69.98	11.50	1.85	0.00	50.00	50.00	46.08	0.66	0.75	0.77	0.74	1.07
G128	2.67	87.00	49.20	1918.57	33.11	57.64	30.67	0.91	0.00	66.67	33.33	26.92	0.51	0.78	0.57	0.49	1.54
G129	3.33	79.75	60.23	2632.77	77.78	83.67	29.67	1.86	16.67	50.00	33.33	35.42	0.67	0.76	0.76	1.11	2.07
G130	4.67	78.33	58.93	2453.47	114.52	88.95	29.42	2.54	16.67	50.00	33.33	34.58	0.38	0.55	0.74	0.69	1.25
G131	6.00	81.92	56.43	2392.94	104.39	69.67	15.22	3.12	66.67	16.67	16.67	35.58	0.30	0.43	0.69	0.39	0.64
G132	4.00	65.25	52.70	2339.18	57.24	68.09	36.72	1.80	16.67	66.67	16.67	31.92	0.59	0.63	0.81	0.87	1.42
G133	3.67	74.25	37.50	1223.94	16.15	37.84	38.83	0.95	0.00	83.33	16.67	23.50	0.44	0.52	0.53	0.56	0.77
G134	5.67	85.83	60.07	2442.30	89.05	69.45	12.08	2.81	50.00	33.33	16.67	43.42	0.42	0.47	0.69	0.53	0.75
G135	8.33	81.42	52.83	2118.94	127.98	49.42	27.33	5.22	83.33	16.67	0.00	32.00	0.22	0.33	0.64	0.20	0.39
G136	8.67	82.83	46.47	1590.74	54.94	28.39	19.19	4.39	100.00	0.00	0.00	27.33	0.19	0.26	0.59	0.15	0.20
G137	4.00	60.17	47.27	1941.87	68.06	73.63	9.75	2.07	33.33	50.00	16.67	27.67	0.51	0.56	0.79	1.06	1.50
G138	7.33	79.92	61.37	2776.24	178.14	74.71	23.94	4.16	83.33	16.67	0.00	35.92	0.29	0.40	0.77	0.30	0.73
G139	8.33	81.42	52.83	2118.94	127.98	49.42	26.61	5.22	83.33	16.67	0.00	32.00	0.22	0.33	0.64	0.20	0.39
G140	9.00	78.33	28.07	689.17	32.28	18.34	3.67	3.18	100.00	0.00	0.00	14.33	0.10	0.17	0.36	0.05	0.15
G141	6.67	81.25	43.43	1657.18	127.78	67.35	18.50	3.44	83.33	16.67	0.00	23.75	0.19	0.33	0.54	0.20	0.63
G142	4.00	60.17	47.27	1941.87	68.06	73.63	6.67	2.07	33.33	50.00	16.67	27.67	0.51	0.56	0.79	1.06	1.50
G143	8.00	67.08	52.50	2118.34	33.55	26.54	15.11	2.81	100.00	0.00	0.00	33.75	0.27	0.32	0.78	0.18	0.23
G144	7.33	73.58	15.03	262.57	6.97	13.24	21.17	1.02	100.00	0.00	0.00	7.92	0.06	0.12	0.20	0.08	0.13
G145	5.33	72.92	43.23	1363.38	53.23	54.72	24.50	1.81	33.33	66.67	0.00	24.67	0.27	0.36	0.60	0.41	0.75
G146	7.33	73.58	15.03	262.57	6.97	13.24	18.33	1.02	100.00	0.00	0.00	7.92	0.06	0.12	0.20	0.08	0.13
G147	5.33	88.00	74.40	4608.60	263.84	127.12	38.50	4.77	66.67	0.00	33.33	47.67	0.40	0.69	0.85	0.96	0.97
G148	5.33	88.00	74.40	4608.60	263.84	127.12	25.83	4.77	66.67	0.00	33.33	47.67	0.40	0.69	0.85	0.96	0.97
G149	6.00	77.42	66.77	3388.34	150.52	86.17	18.33	3.99	66.67	33.33	0.00	42.42	0.35	0.52	0.86	0.66	0.67
G150	8.33	75.33	43.20	1338.70	23.05	18.34	9.11	2.85	100.00	0.00	0.00	29.33	0.21	0.25	0.56	0.10	0.15

DS: Disease severity, MR: Mean rank.