

Evaluation of wheat seed parts in control plots (seed purity and seed-borne diseases) In Chaharmahal and Bakhtiari province

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ABSTRACT: To identify and determine the purity of the seed, random samples of 30 seed shipments of bread and Durum wheat seed in controlled plots were planted in an area of 27 square meters. After the emergence of the bushes based on the Zadoks decimal code, some of the morphological characteristics were recorded. Descriptive and analytical statistics showed that in the studied wheat cultivars, the variation coefficient of features such as plant's growth type, plant's length, peduncle length, the shape of the bottom folder shoulder, number of spikelet per spike, number of seed per spike, and density of spike in wheat cultivars plants, indicate the lack of purity in improved cultivars.

Key words: wheat, cluster analysis, purity, controlled plot

INTRODUCTION

Wheat is one of the most strategic products all over the world. One of the most important characteristics of wheat among cereals is human's nourishing of it as the main course. Economic importance of wheat in terms of both production and nourishment is more than other agricultural products all over the world (Khodabande, 1379). Elzevir and Aluizio (1999) investigated 7 features in 6 wheat cultivars of bread. They introduced plant height, number of days to the emergence of the first spikelet, number of seed per spike, spike's length, spike's shape, awn of the spike, and spikes density as indicators and presenters of wheat cultivars.

Lima-Brito et al (2006) investigated the operation, cytological and molecular characteristics of wheat and its F1 hybrids. In this study, functional and apparent characteristics such as the main stem's length, the waxy leaf flag, date of spike up, spike's length, waxy spike, spike's density, the number of spikelet, awns' length, number of grain per spikelet and the weight of the main spike's seeds were given attention. Studying apparent characteristics includes studying the seed up to the complete plant. Controlled plots begin by planting the random samples of seed supplies in the farm. This study is done by spending a lot of time and money by the cultivar's controller. In this study, the purpose of testing the controlled plots is to investigate and determine the purity of wheat cultivars in seed mater classes. Achieving this aim was accomplished by performing laboratory tests on random samples of seed masses on the proliferation and recording and estimating the diversity of measured morphological features in the controlled plots that have been made from planting the mentioned samples.

MATERIALS AND METHODS

This research was performed in the year 1391 in Imam Qais region in Borojen city of Chaharmahal and Bakhtiari province with the longitude of the area 21-51 eastern, latitude 31-44 northern, altitude 2400 meters. In this area, the average total annual rainfall is 698/5 mm and the average moisture is 49 percents, based on coupon's segmentation it is among temperate climates with warm and dry summers. The maximum temperature of the region is 34 ° C, its minimum is -18/5 ° C and the average temperature is 30 ° C (Sharekord weather data, 1391). In order to identify and determine the purity of the seed, random samples of 30 shipments of bread wheat seed and Durum in mater level which was mainly in control project and seed certification (cold areas) or improved seeds available in the country, were cultivated and were sampled after harvest and planted in an area of 27 square

meters controlled plots (7 lines with a distance of 55 cm and a length of 5 m) to implement this project. Also in the established controlled plots at first 20 plants are selected randomly and marked, and at different stages of plant's growth and development based on the Zadoks decimal code, some of the morphological characteristics that are not affected by environmental conditions and are in accordance with the descriptor of international union for the protection of new plant varieties are recorded. The test also is designed in a way that it can carry out statistical analysis and decision-making on the basis of statistical reliability. Seed purity of the cultivar is expressed by the ratio of the number of out of type bushes to the total number of planted bushes. Controlled plots size is considered to be at least 27 square meters in order to count the number of out of type people in controlled plots based on the existing standards (controlled plots guideline of the Economic Cooperation and Development Organization, 2001). For grouping individuals within and between the controlled plots based on the degree of similarity or difference, cluster analysis of multivariate statistical method, one of the most common statistical methods, was used. The algorithm used for cluster analysis was considered for quantitative characteristics Ward and for the qualitative characteristics Median and to evaluate the performance of this algorithm, Cophenetic correlation coefficient which is one of the most common methods was used. The optimal number of clusters also was determined by using the mean and standard deviation values of the distance between genotypes in the place of merging clusters (Upper tail limit method).

RESULTS AND DISCUSSION

Plant's growth type

Plant's growth habit was measured from the status of plant leaves and tillers and by observational method and at the 25 to 29 stages of Zadoks decimal code. To do this, the angle formed between the outer leaves and tillers with an imaginary horizontal axis was used. Cluster analysis results using the median method in Euclidean distance of 5 for this feature, grouped the shipments of studied wheat cultivars' seed in controlled plots into 3 separate clusters (Figure 1). As the table of one-way analysis of variance shows the attribute of growth type wheat cultivars, in terms of this attribute wheat cultivars showed a significant difference at 1% level (Table 2). Descriptive statistical table of wheat cultivars' characteristics in controlled plots shows that the Sardari cultivar with a score of 9 has a sleeping growth type and other cultivars have more standing growth types than these two cultivars (table 1).

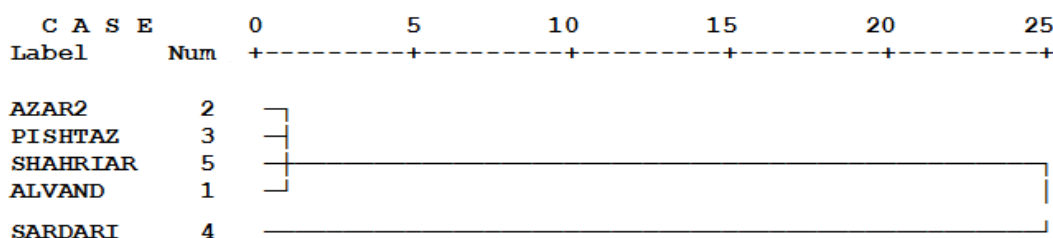


Figure 1. Cluster analysis of wheat cultivars for the plant's growth habit attribute

Plant length

This attribute was measured by measuring devices at 75 to 92 stages of Zadoks decimal code. Note that the stem length includes stem length+ spikelet length+ awn length. Cluster analysis results using the ward method in Euclidean distance of 5 for this feature, grouped the shipments of studied wheat cultivars' seed in controlled plots into 2 separate clusters (Figure 2). The lowest variation coefficient of this attribute in Shahriyar's cultivar was estimated to be 2/5%. Therefore, all of these cultivars are considered to be more uniform in terms of this attribute. The highest variation coefficient for this attribute also occurred to Alvand's

cultivar with a rate of 2/1% which shows the non-uniformity of this cultivar in terms of this attribute (Table 1). As the table of one-way analysis of variance shows the plant length of wheat cultivars, in terms of this attribute wheat cultivars showed a significant difference at 1% level (Table 2). Descriptive statistical table of wheat cultivars' characteristics in controlled plots shows that Sardari cultivar and Azar 2 dryland cultivar respectively with the plant length of 103 and 121cm won the highest plant length and Pishtaz cultivar with a plant length of 82/8 cm won the lowest plant length among other cultivars (Table 1).

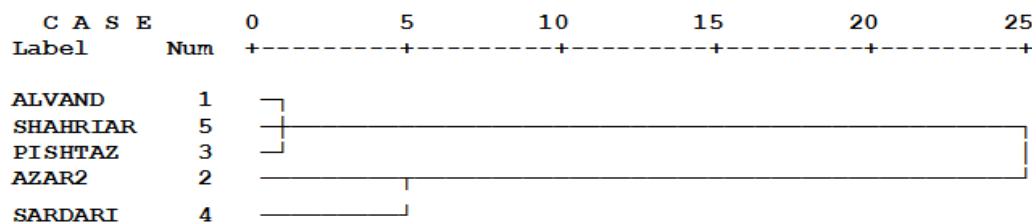


Figure 2. Cluster analysis of grain cultivars for the plant length attribute (stem+ spike+ awn)

Flower stalk length

This attribute was measured at the 85 to 92 stages of Zadoks decimal code. The measurement unit was mm and the distance between the last nodes of the stem to the flower spikes was measured as flower's stalk length. Cluster analysis results using the ward method in Euclidean distance of 5 for this feature, grouped the shipments of studied wheat cultivars' seed in controlled plots into 3 separate clusters (Figure 3). The lowest variation coefficient of this feature was estimated 0/09% in Alvand cultivar. So this feature in this cultivar enjoys the relative purity. And the highest variation coefficient of this

feature was 0/7% which was arrived to Pishtaz cultivar that shows the non-uniformity of this feature n this cultivar (Table 1). As the ANOVA table of wheat cultivars flower stalk length indicates, in terms of this attribute wheat cultivars showed a significant difference at 1% level (Table 2). Descriptive statistical table of wheat cultivars' characteristics in controlled plots shows that Sardari and Azar 2 cultivars respectively with the flower stalk length of 22/3 and 19/7cm won the highest flower stalk length and Pishtaz cultivar with a flower stalk length of 10/8 cm won the lowest flower stalk length among other cultivars (Table 1).

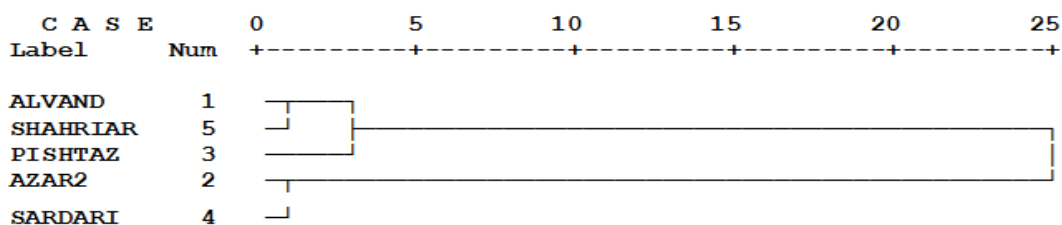


Figure 3. Cluster analysis of grain cultivars for the flower stalk length attribute

Spike length

This attribute was measured at the 80 to 92 stages of Zadoks decimal code. The measurement unit was mm and the distance between the last nodes of the stem to the flower spikes was measured as flower's stalk length. Cluster analysis results using the ward method in Euclidean distance of 5 for this feature, grouped the shipments of studied wheat cultivars' seed in controlled plots into 2 separate clusters (Figure 4). The lowest variation coefficient of this feature was estimated 0/1% in Alvand cultivar. So this feature in this cultivar enjoys the relative purity. And the highest variation coefficient of this feature was 0/8% which was arrived to Shahriar cultivar that shows the non-uniformity of this feature n this cultivar (Table 1). As the ANOVA table of wheat cultivars spike length indicates, in terms of this attribute wheat cultivars showed a significant difference at 1% level (Table 2). Descriptive statistical table of wheat cultivars' characteristics in controlled plots shows that Alvand cultivar with the spike length of 20/8 cm won the highest spike length and Azar2 cultivar with a spike length of 18/2 cm won the lowest spike length among other cultivars (Table 1).

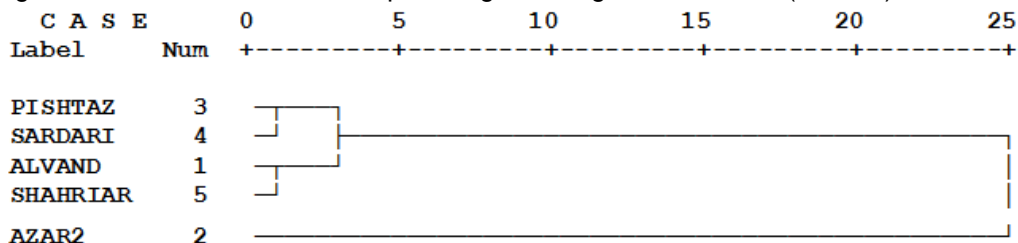


Figure 4. Cluster analysis of grain cultivars for the spike length attribute

Number of spikelet per head

This attribute is measured at 80 to 92 decimal ZADKS and growth stages of observational and by counting the number of spikelet in spikes stem. Ward cluster analysis on Euclidean distance of 5 for this property, shipments of the wheat seed in control plots in 4 distinct clusters (Figure 5). The lowest coefficient of variation for this trait in ALVAND digit, were estimated in 5/0 percent. So this trait in these figures is having the relative purity. The highest coefficient of variation for this trait is also dedicated to the 1.0 percent in SARDARY digit that this figure shows the heterogeneity of this trait (Table 1).

As ANOVA table (analysis of variance, a statistical method in which the variation in a set of observations is divided into distinct components.) shows the number spikelet per in spike wheat varieties, cultivars of this trait showed a significant difference at the 1% level (Table 2).Table statistical properties of wheat cultivars in control plots show that the spikelet per in spike ALVAND and SHAHRIAR digits were estimated the largest number of spikelet per in spike, with an average of 18 spikelet.SARDARY digit were estimated the minimum number of spikelet per in spike, with an average 11 spikelet allocated among the cultivars (Table 1).

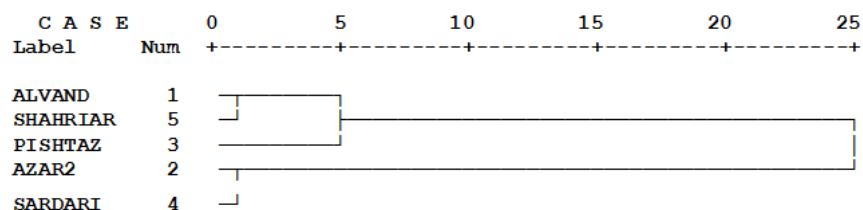


Figure 5. Cluster analysis of wheat for the number of spikelet per in spike

The number of grains in per spike

This attribute is measured at 80 to 92 decimal ZADKS and growth stages of observational and it was done by counting the number of grains in per main stem. . Ward cluster analysis on Euclidean distance of 5 for this property, shipments of the wheat seed in control plots in 3 distinct clusters (Figure 6). The lowest coefficient of variation for this trait, were estimated in the vanguard digit of the 4.0 percent. So this trait in these figures is having the relative purity. The highest coefficient of variation for this

trait also ALVAND digit was given amount of 2%, which indicates that the non-uniformity of the figure of the character (Table 1).As ANOVA table shows the number of seeds per spike of wheat, Wheat cultivars of this trait showed a significant difference at the 1% level (Table 2).Table statistical properties of wheat cultivars in control plots shows That the SHAHRYAR digit is allocated the highest number of grains per spike, number of grains per spike 64 and the SARDARY is allocated the lowest seed to average 16.5 grains per spike among cultivars (Table 1).

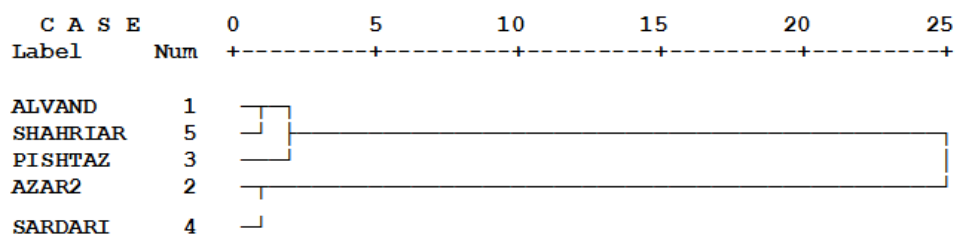


Figure 6. cluster analysis for Wheat cultivars seeds per spike

Folder shoulder down form

This attribute is measured at 92 decimal growth stages ZADKS and it was done observational (Figure 7). Analysis of cluster median Euclidean distance of 5 for this property, shipments seed disinfection control plots investigated in cluster 3 contract (Figure 8). This attribute indicates the coefficient of variation for the SHAHRIAR digit is zero that in terms of this trait is pure numbers.The highest coefficient of variation in the value of this property is 8/6 percent belong to the leading figure of the gross indicator that the terms of this trait (Table 1).

As a one-way analysis of variance attribute the shoulder folder shows low of wheat cultivars, wheat cultivars in terms of the characteristic differences are significant at 1% level (Table 2).

Table statistical properties of wheat varieties in the control plots showed that the figures Azar 2, SHAHRIYAR and ALVAND having slightly sloping shoulders folder has received 3 points. Leading figure also has

a folder with sloping shoulders (Score: 1) the lowest score and 5 being the flat shoulder Sardary having received the data (Table 1).

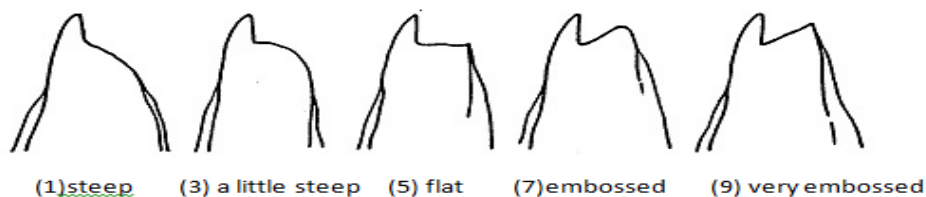


Figure 8. Condition Scoring the lower shoulder folder

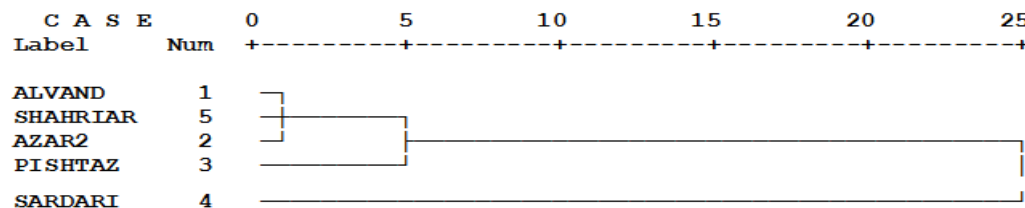


Figure 9. cluster wheat to attribute the lower shoulder folder

Morphological characteristics	Floor seed	Count	Average	Standard deviation	95% confidence range for the average		Coefficient of variation
					Minimum	maximum	
Type of plant growth	ALVAND	100	3,07	0,057	3	3,15	1,856
	AZAR 2	100	2,78	0,097	2,65	2,78	3,506
	PISHTAZ	100	1,96	0,114	1,58	2,15	5,817
	SARDARY	100	8,78	0,164	8,6	9	1,871
	SHAHRYAR	100	1,47	0,075	1,35	1,55	5,158
Plant height	ALVAND	100	88,23	1,869	84,88	89,095	2,119
	AZAR 2	100	103,964	0,347	103,405	104,343	0,334
	PISHTAZ	100	82,856	0,237	82,52	83,16	0,286
	SARDARY	100	121,644	0,618	121,11	122,57	0,508
	SHAHRYAR	100	90,526	0,226	90,28	90,84	0,25
Flower tail length	ALVAND	100	13,91	0,013	13,09	13,93	0,096
	AZAR 2	100	19,759	0,036	19,705	19,805	0,187
	PISHTAZ	100	10,866	0,086	10,755	11	0,798
	SARDARY	100	21,336	0,073	21,23	21,41	0,343
	SHAHRYAR	100	14,117	0,1	13,95	14,205	0,713
Spike length	ALVAND	100	20,859	0,022	20,82	20,87	0,106
	AZAR 2	100	18,244	0,037	18,19	18,285	0,207
	PISHTAZ	100	20,244	0,058	19,985	20,145	0,293
	SARDARY	100	20,14	0,058	19,985	20,145	0,293
	SHAHRYAR	100	20,615	0,178	20,3	20,72	0,864
Number of spikelet per spike	ALVAND	100	18,23	0,103	18,15	18,4	0,568
	AZAR 2	100	12,48	0,125	12,3	12,6	1,005
	PISHTAZ	100	15,03	0,144	14,9	15,25	0,958
	SARDARY	100	11,15	0,122	11,05	11,35	1,098
	SHAHRYAR	100	18	0,154	17,75	18,15	0,856
Number of seeds per spike	ALVAND	100	63,26	1,267	61	64	2,003
	AZAR 2	100	18,25	0,267	17,8	18,5	1,513
	PISHTAZ	100	48,49	0,23	48,2	48,75	0,474
	SARDARY	100	16,56	0,25	16,2	16,8	1,515
	SHAHRYAR	100	64,05	0,538	63,25	64,55	0,84
lower shoulder folder Form	ALVAND	100	2,98	0,044	2,9	3	1,5
	AZAR 2	100	3,24	0,114	3,1	3,4	3,519
	PISHTAZ	100	1,66	0,114	1,5	1,8	6,868
	SARDARY	100	5,88	0,083	5,8	6	1,422
	SHAHRYAR	100	3	0	3	3	0

Table 2 summarizes the results of ANOVA class morphological characteristics of wheat seed in control plots			
Morphological characteristics	Sources of change	Degrees of freedom	Mean square
Type of plant growth	Among figures	4	43.76**
	In figures	16	0.013
Plant height (stem + spike + awn)	Among figures	4	1217.15**
	In figures	16	0.809
Flower tail length	Among figures	4	96.088**
	In figures	16	0.006
Spike length	Among figures	4	5.320**
	In figures	16	0.009
Number of spikelet per spike	Among figures	4	50.76**
	In figures	16	0.018
Number of seeds per spike	Among figures	4	2739.36**
	In figures	16	0.42
lower shoulder folder Form	Among figures	4	11.911**
	In figures	16	0.007

** , * , Ns, respectively, representing a five percent significance level, lack of significance

CONCLUSION

Find a wide variety of features such as the type of plant growth, plant length, tail length, flower Form shoulder folder down, the number of spikelet per spike, grains per spike, spike density in wheat plants, On the other hand, indicate that this is the purity of domestic cultivars and hybrids of the other party may have the potential was Plant to determine the purity of the reformers of the cultivars.

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