Journal of Agricultural Science; Vol. 8, No. 6; 2016
ISSN 1916-9752 E-ISSN 1916-9760
Published by Canadian Center of Science and Education

Comparative Productivity and Adaptive ability of Forage Pea (*Pisum sativum* L.) and Vetch (*Vicia sativa* L.) Cultivars

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Received: February 29, 2016 Accepted: March 31, 2016 Online Published: May 15, 2016

doi:10.5539/jas.v8n6p109 URL: http://dx.doi.org/10.5539/jas.v8n6p109

Abstract

Adaptive potential of forage pea and vetch accessions was estimated based on seed yield and yield components. A varietal-specific reaction of the studied accessions to environmental conditions was established. The conducted assessment of selective value of genotypes gave accurate data for breeding of highly productive forms. Among studied pea varieties the following were characterized to possess adaptive ability and selective value—Glyans for numbers of seeds (1000 seed weight and seed yield), Kamerton for plant height, and Svit for seed yield. In terms of general adaptive ability and stability in plant height with the greatest value as a starting material was vetch variety Vilena. Moldovskaya was of interest in terms of 1000 seed weight. Liya is preferred vetch genotype for improving the number of seeds per plant and for selection of new forms for improving grain yield.

Keywords: adaptive ability, productivity, selective value of genotype, forage pea, vetch

1. Introduction

Pea and vetch are ones of the main annual legumes used in fodder production (Sarviro & Martynyak-Pshibyshevska, 2001; Vishnyakova, 2008). These species have wide application in modern agriculture due to their high productivity and relatively less rigorous growing conditions (Goncharov, 2011). To the present moment considerable attention is devoted for assessment of the separate components of yield (Debeliy et al., 2011).

An important task in breeding is development of cultivars that can realize a high productive potential in wide range of soil-climatic conditions (Vorobyov, 2009). The stabilization of productive potential of the crops requires a complex application of breeding and agrotechnical approaches among targeted at development of new cultivars that realize high productive potential (Medvedev, 2011; Vishnyakova, 2012).

Developing ecologically resistant varieties is priority in breeding of agricultural crops. The transition toward adaptability is possible on condition that the cultivated species and varieties are capable to effectively use native and artificial resources to the greatest extent (Medvedev, 2011; Vishnyakova, 2012). The increasing requirements for new varieties to possess tolerance to stress factors determine the necessity of development of adaptive and ecological direction in breeding process. The presence of perspective initial material having high-adaptive potential in some traits has an important role in future hybridizations (Anohina et al., 2007; Batalova, 2013).

Since the yield is determined by the interaction of genotype and environment, there is a necessity of comprehensive approach in designing breeding programs aimed at increasing the potential of ontogenetic adaptability of genotype. There are many methods for statistical analysis of the genotype-environment interaction which allow assessment of adaptability of genotypes towards environment. Kilchevskiy and Hotyleva (1985, 1989) have proposed a method to analyze the genotype-environment interaction which allows simultaneous analysis of general and specific adaptability (Kilchevskiy, 2005). This method allows to determine the breeding value of genotype and to conduct natural selection depending on breeding task. The authors underline that when considering stability is expediently to be used more than one mutually complementary parameters (Fadeev, 2014).

Practice has shown that the assessment of the parameters of adaptive ability, stability and breeding value of varieties and lines allows with precision to determine the best genotype for given area for cultivation (Vorobyov & Vorobyov, 2011).

The aim of the study was to conduct an assessment of adaptive potential of vetch and pea accessions with regards to traits determining the productivity and yield.

2. Method

2.1 Establishment of a Field Experiment

The field trial was carried out from 2012 to 2014 at the Institute of Forage Crops, Pleven (43.41ºN, 24.61ºE), situated in the central part of the Danube hilly plain. The trial was set up as a complete block design method with three replications and with a plot size of 4 m^2. The sowing was done by hand, at a depth of 5 cm and with a rate of 120 and 220 seeds m^{-2} for pea and vetch, respectively. The plants were cultivated in organic farming conditions without use of any fertilizers and pesticides (Table 1). Weeds were controlled mechanically during the growing period.

Table 1. Chemical composition of the chernozem soil during the trial in Pleven (2012-2014)

Humus (%)	Nitrogen (mg 10^{-3} soil)	Phosphorus (mg 10^{-2} soil)	Potassium (mg 10^{-2} soil)	pH in KCl	pH in H_2O
2.48	0.225	4.29	31.1	5.87	6.54

Ten randomly selected plants from each unit were marked and used to estimate yield components—plant height (cm); 1000 seed weight (g); number of pods per plant and number of seeds per plant. Seed yield (kg ha^{-1}) was found based on seed yield per plot at the end of growing season at a standard seed moisture content of 14%. For all traits an arithmetical average was calculated.

2.2 Plant Material

Four spring cultivars of pea (*Pisum sativum* L.) were included in the trial namely Glyans, Svit, Kamerton and Modus and four spring vetch (*Vicia sativa* L.) cultivars namely Liya, Lorina, Vilena and Moldovskaya. The origin of pea cultivars is Ukraine, and of vetch cultivars, Moldova.

2.3 Weather Conditions

Single trial years were used as the factor of environmental conditions. Some monthly meteorological data during the period of crop growth are given in Figure 1.

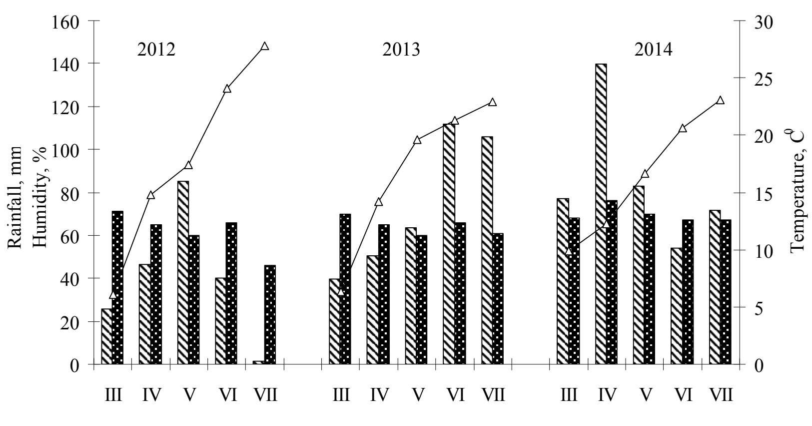

Figure 1. Climatic characterization of the experimental period

The meteorological conditions during experimental period were different considerably. The average daily air temperature in 2012 (March-April) was 1.2 and 1.5 °C higher as compared to 2013 and 2014, respectively. The high temperature in 2012 coupled with lower rainfall (as compared to 2013 and 2014) determined this year as drier and unfavorable for plant development. Considerably greater amount of rainfalls in 2014, their even distribution, as well as lower temperature (not exceeding 24 °C) created favorable conditions for plant growth and development. The year 2013 was intermediate.

2.4 Statistical Analyses and Methods

The obtained data were processed by two-factor analysis of variance for each trait for determine of effects of genotypes (G), (E) environments and genotype environment interaction (G × E). The estimation of the ecological stability of the tested cultivars was done through the application of regression analysis according to Finlay and Wilkinson (1963).

The method of Kilchevsky and Hotyleva (1985a; 1985b) was used for the characterization of: general adaptive ability (GAA: characterized average meaning of trait in different environmental conditions) and specific adaptive ability (SAA: characterized deviation from the GAA in certain environment), relative stability of the genotypes (Sgi: indicator which for comparing different crops and varieties); variance of specific adaptability (σ^2CACi); organism's reaction to the cultivation place (Igi), criterion for estimation of the genotype ability to enter into interaction with environment (σ(GxE)gi) and selective value of genotype (SVG: used for determining the variety which combines high-productiveness and stability). Stress resistance (Y) (Rossielle & Hamblin, 1981), homeostatic (Hom) (Hangildin, 1984) and stability index of the variety (SV) (Nettevich et al., 1985; Nettevich, 2001) were determined. The interdependence between yield and parameters of stability and adaptability were determined by correlation analysis (Dimova & Marinkov, 1999). All experimental data were statistically analyzed by MS Excel (2003) for Windows XP and computer software PBSTAT 1.2.

3. Results and Discussion

Data for adaptability and stability can be obtained when studying a new breeding material in different years, which shows particular reactions of genotype to the change in ecological conditions. If the value of any trait is changing during the years it is an indication for the presence of genotype × environment interaction whose effect could be analyzed as dispersion complex (Korzun & Bruylo, 2011).

The results of dispersion analysis (Table 2) of the traits confirm differences in terms of the years. In pea varieties, for all traits, the genotypes (varieties), environmental conditions and interaction between them were significant. Differences for interaction genotype-environment in regard of traits mass of 1000 seeds, number of pods and seeds per plant were not significant for vetch varieties.

Table 2. Analysis of variance for stability for seed yield and yield components in pea and vetch cultivars

ANOVA	df	MS				
Pea cultivars		plant height (cm)	1000 seed weight (g)	pods per plant	seeds per plant	Seed yield (kg da^{-1})
Environments	2	6033.00**	64.00**	372.00**	133.33**	101109**
Genotypes	3	752.89**	5.67**	70.56**	2844.89**	6795.11**
Genotypes × Environments	6	80.56**	1.33*	19.55*	603.56**	596.11**
Error	11					
Vetch cultivars		plant height (cm)	1000 seed weight (g)	pods per plant	seeds per plant	Seed yield (kg da^{-1})
Environments	2	1 716.33**	144.33*	61.5409 ns	129.33**	3002.33**
Genotypes	3	34.22**	2.22 ns	123.3943 ns	242.66*	8036.78**
Genotypes * Environments	6	106.56**	9.22 ns	13.4446 ns	21.33 ns	804.11*
Error	11					

Note. *; **: Significant at 0.05; 0.01 probability levels, respectively; ns, non significant.

The adaptability of the varieties to the environmental conditions can be assessed through their plasticity, expressed through different criteria. In our research we used coefficient of regression (bi) of Finlay and Wilkinson (1963). The more it exceeds unity, so more the cultivar is responsive to the terms of cultivation. If the value of bi coefficient is close to unity, then the cultivar is the most pliable and well adapted to various environmental conditions. When bi is considerably less than unity, the variety is appropriate for growing under adverse conditions. Zero or near to that value of coefficient of regression (bi) shows that the variety does not respond to changes of the environment.

3.1 Stability Parameters, Yield Components and Yield of Pea Varieties

The influence of environmental conditions on the formation of traits is expressed by the coefficients of regression. They characterize the average reaction of the genotype, show its stability or responsiveness and give an opportunity to predict the change of the analyzed trait in the framework of specific growing conditions. In our studies of pea varieties (Table 3) with regards to plant height, high responsiveness in cultivation in different conditions was manifested in Glyans (bi = 1.21). In Svit (bi = 1.02) and Modus (bi = 0.99) was comparatively lower bi which meant the best adaptability of trait. Svit came close to the desired breeding compromise for traits number of seeds per plant and grain yield combining very good stability with satisfying productivity. For the trait mass of 1000 seeds the tested varieties reacted in a similar way to the changes in the environment and showed relatively close stability. From breeding perspective the most interesting cultivar was Glyans (bi = 1.04) with the highest mass per 1000 seeds, followed by Modus (bi = 1.05) and Svit (bi 1.10).

Table 3. Parameters of stability and adaptability in the studied traits of forage pea varieties

Variety	Trait	b_i-FW	σ(GxE)gi	σ2CACi	Igi	Sgi	SVG
	Plant height						
Glyans	68.57	1.21	2.50	295.84	0.01	25.09	36.98
Svit	65.03	1.02	8.68	265.34	0.03	25.05	35.12
Kamerton	82.50*	0.78	41.19	617.59	0.07	30.12	36.87
Modus	67.80	0.99	-1.60	377.70	0.00	28.66	32.11
	1000 seed weight						
Glyans	228.52*	1.04	0.30	6.47	0.05	38.16	3.04
Svit	216.78	1.10	0.18	2.38	0.08	27.54	3.40
Kamerton	194.95	0.81	0.02	3.66	0.01	34.58	2.81
Modus	200.39	1.05	-0.02	3.97	-0.01	40.13	2.13
	Pods per plant						
Glyans	6.67*	1.32	6.03	300.55	0.02	25.28	36.94
Svit	5.60	0.58	12.22	270.05	0.05	25.27	35.05
Kamerton	5.53	0.41	44.72	622.30	0.07	30.24	36.99
Modus	4.97	1.69	1.94	382.41	0.01	28.84	32.13
	Seeds per plant						
Glyans	23.57*	1.58	6.03	50.56	0.12	30.17	8.66
Svit	19.13	1.08	0.12	15.53	0.01	20.60	10.87
Kamerton	20.03	0.57	1.64	12.81	0.13	17.86	12.53
Modus	17.67	0.77	2.63	22.35	0.12	26.76	7.75
	Seed yield						
Glyans	271.12**	1.50	240.92	6899.97	0.03	30.64	116.43
Svit	247.77*	0.98	-63.21	5394.22	-0.01	29.64	110.99
Kamerton	231.43	0.65	289.97	7130.95	0.04	36.49	74.17
Modus	215.57	0.87	259.16	5391.54	0.05	34.06	78.83

Note. b_i-FW: Regression coefficient Finlay and Wilkinson's regression model; GAA: general adaptive ability; SAA: specific adaptive ability; Sgi: relative stability of the genotypes; σ^2CACi: variance of specific adaptability; Igi: organism's reaction to the cultivation place, σ(GxE)gi: criterion for estimation of the genotype ability to enter into interaction with environment; SVG: selective value of genotype.

*; **: Significant at 0.05; 0.01 probability levels, respectively.

Another cultivar of particular interest was Glyans (bi = 1.04) with the highest mass per 1000 seeds, followed by Modus (bi = 1.05) and Svit (bi 1.10). The cultivars reacted in a quite different way to the environment with regards to number of pods per plant. Glyans forms 6-7 pods per plant while Modus produced 4-5 pods per plant and were characterized as responsive. Svit and Kamerton were ecologically stable, but with an average rate of the trait expression.

3.2 Stability Parameters, Yield Components and Yield of Vetch Varieties

Differences for plant height and mass per 1000 seeds were not significant for vetch varieties. Lorina and Moldovskaya were ecologically stable with bi ≈ 1 for two traits (Table 4).

Number of pods per plant appears to be one of the important components of productivity. For this trait variety Liya statistically exceeded the other varieties, forming more than 8 pods per plant, but this variety along with Moldovskaya can be considered as ecologically unstable. For these varieties high yields can be obtained with intensive technology use. The trait number of seeds per plant takes part in the yield formation and therefore is of certain interest to breeders. The plants of variety Liya formed most seeds and showed the greatest responsiveness to improving growing conditions.

Variety Vilena is also distinguished by high productivity, but also has the lowest coefficient of regression (bi = 0.57), which defines it in the group of stable varieties. With regard to the comprehensive trait grain yield, Liya and Vilena showed the highest values and analogically react to the environment, which is an indication that they possess different genetic systems. Hybrids possessing high yields and ecological stability can be obtained by crossing them. Varieties Lorina and Moldovskaya were low-yielded and stable with respect to environmental changes.

Table 4. Parameters of stability and adaptability in the studied traits of vetch varieties

Variety	Trait	b_i-FW	σ(GxE)gi	σ2CACi	Igi	Sgi	SVG
	Plant height						
Liya	80.43	1.21	12.49	178.39	0.07	16.61	29.96
Lorina	80.37	1.02	11.87	130.19	0.09	14.20	37.25
Vilena	83.63	0.78	19.26	36.86	0.52	7.26	60.69
Moldovskaya	82.40	0.99	20.30	149.98	0.14	14.86	36.12
	1000 seed weight						
Liya	57.20	1.04	1.23	17.10	0.07	7.23	18.26
Lorina	56.91	1.10	1.89	12.35	0.15	6.18	23.82
Vilena	57.47	0.81	0.88	7.19	0.12	4.66	32.23
Moldovskaya	56.15	1.05	1.19	3.17	0.37	3.17	39.38
	Pods per plant						
Liya	8.33*	1.32	0.45	2.12	0.21	17.48	2.76
Lorina	7.10	0.58	0.36	0.47	0.77	9.63	4.48
Vilena	7.37	0.41	-0.01	1.09	-0.01	14.18	3.37
Moldovskaya	7.00	1.69	-0.02	0.59	-0.03	10.95	4.07
	Seeds per plant						
Liya	42.27**	1.58	0.17	10.45	0.02	7.65	23.38
Lorina	37.03	1.08	3.40	0.94	3.63	2.61	31.38
Vilena	39.97**	0.57	6.76	19.10	0.35	10.93	14.44
Moldovskaya	31.67	0.77	1.78	17.05	0.10	13.04	7.54
	Seed yield						
Liya	149.18**	1.50	334.81	713.34	0.47	17.90	54.43
Lorina	98.53	0.98	55.62	234.31	0.24	15.54	44.23
Vilena	122.60*	0.65	132.68	184.77	0.72	11.09	74.38
Moldovskaya	92.03	0.87	-13.03	118.94	-0.11	11.85	53.34

Note. FW: Regression coefficient Finlay and Wilkinson's regression model; GAA: general adaptive ability; SAA: specific adaptive ability; Sgi: relative stability of the genotypes; σ^2CACi: variance of specific adaptability; Igi: organism's reaction to the cultivation place, σ(GxE)gi: criterion for estimation of the genotype ability to enter into interaction with environment; SVG: selective value of genotype.

*, **: Significant at 0.05; at 0.01 probability levels, respectively.

3.3 Estimation of Adaptability and Stability of Pea Varieties

The analysis of the coefficient of linear regression for yield and yield components of a certain hybrid or population under changes in environmental conditions allows for additional characterization of their adaptability.

The conducted genetic-statistical analysis when studying pea varieties (Table 3) showed that for plant height variety Kamerton had the highest values of GAA (11.53) and σ2CACi, respectively. The same variety manifested the best interaction with environment (σ(GxE)gi) followed by Svit. Linear reaction (Igi→0) towards the environment was found for all varieties (with exception of Modus). Glyans and Kamerton showed best results regarding SVG, 36.98 and 36.87 respectively.

Variance of SAA (σ^2CACi) in regard for the trait 1000 seed weight ranged from 2.38 (Svit) to 6.47 (Glyans). The Sgi parameter varied in limits from 27.54 to 40.13 and variety Kamerton was the most preferred for this parameter. Criterion σ(GxE)gi was used for estimation of genotype-environment interaction. According to this criterion Svit and Modus showed the greatest values. Similarity among Glyans, Svit and Kamerton was found for Igi and they showed linear reaction at their interaction with the environment (Igi→1). The high values of SVG determined Svit and Glyans as selectively valuable. The varieties Glyans (29.89) and Svit (18.15) for the same trait revealed the highest GAA (Figure 2) although there was some fluctuation of SAA during different years.

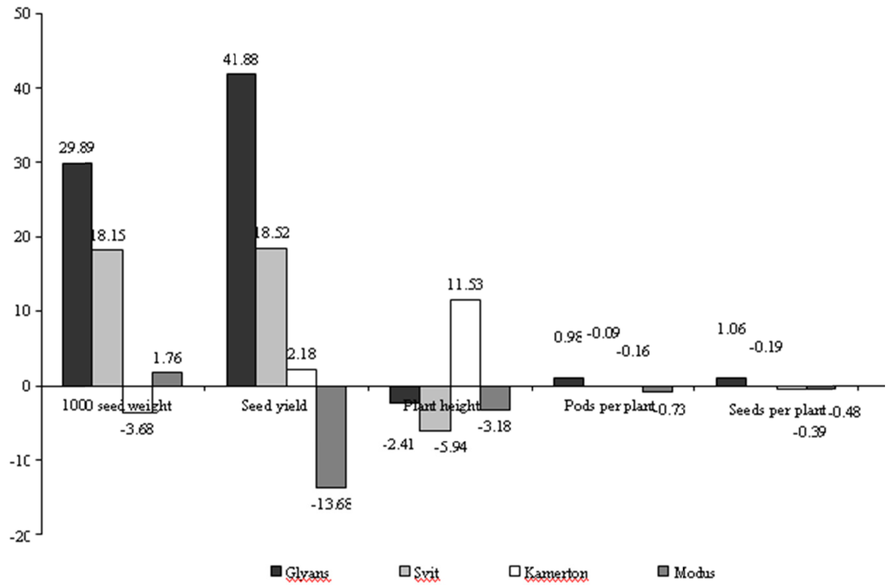

Figure 2. General adaptive ability in the studied traits of forage pea varieties

According to the results of the analysis of pods per plant Glyans combined relatively good GAA (0.98), productivity (6.67) and SVG (36.94) compared to the other varieties. The studied accessions demonstrated linear response (Igi→0) towards the environment. Glyans and Svit were distinguished with relatively higher stability (Sgi) in this trait. For the trait pods per plant variety that combines high GAA and Sgi cannot be pointed out.

According to the data presented in Table 3 and Figure 2 for seeds per plant, variety Glyans was different from the others with a higher manifestation of the general adaptive ability (3.47) and specific adaptive ability (50.56) and a good selective value (8.66). The varieties responded linearly (Igi→0) to environment.

With respect to the complex trait of seed yield with high GAA Glyans (41.88) and Svit (18.52) were distinguished. Specific adaptive ability evaluated by criterion σ^2CACi fluctuated in range from 5391.54 (Modus) to 7130.95 (Kamerton). The indicator of relative stability (Sgi) ranged from29.64 (Svit) to 36.49 (Kamerton). Kamerton and Modus had the best values for this parameter as well as for criterion (σ(GxE)gi).With the exception of Svit the rest of varieties responded linearly (Igi→0) towards environmental conditions. Glyans and Svit had higher selective value, grain yield and general adaptive ability.

3.4 Estimation of Adaptability and Stability of Vetch Varieties

For natural conditions of central northern Bulgaria with clearly pronounced continental climate an important indicator which characterized varieties is their resistance to stress. This parameter had a negative sign for all varieties (Table 5). The higher the value for this parameter, the greater sustainability of variety to stress. Based on the conducted studies, it was established that vetch varieties show better resistance to various. Varieties Moldovskaya, Vilena and Liya had an average level of resistance. Two of pea varieties (Modus and Svit) exhibited satisfactory stress-resistance compared to the others.

With respect to stability index, characterising the yield stability, and of breeding interest was vetch variety Vilena, followed by Liya, which was the most sensitive to stress. Among pea varieties, Svit had good combination between stability parameters of yield and stress resistance while Glyans had the highest stability.

Table 5. Stress resistance, stability and homeostatic of varieties, 2012-2014

Parameters of adaptability							
Pea varieties	У	SV	Hom	Vetch varieties	У	SV	Hom
Glyans	-160.03	2360.56	5.44	Liya	-54.2	1487.55	15.02
Svit	-139.97	2028.69	26.78	Lorina	-30.55	715.41	19.40
Kamerton	-160.45	1444.88	4.45	Vilena	-27.74	1526.05	36.64
Modus	-136.7	1336.47	4.53	Moldovskaya	-22.22	772.01	30.84

Note. У: stress resistance; Hom-homeostatic; SV: stability of the variety.

One of the most important indicators characterizing the plant resistance to adverse environmental factors is their homeostasis, which is a universal property of the organism to minimize the adverse impact of the external environment. The criterion homeostasis of variety can be considered as an ability to maintain a low variability of the trait (Kondratenko et al., 2014). Varieties in both plant species showing the best stability (Vilena and Svit) are distinguished also by the highest values of this parameter.

For breeding aspects, one of the main and important traits characteristic of forage crops is plant height (Fadeev, 2014). In present study, the results of the analysis of quantitative traits of vetch varieties are presented in Table 4 and Figure 3.

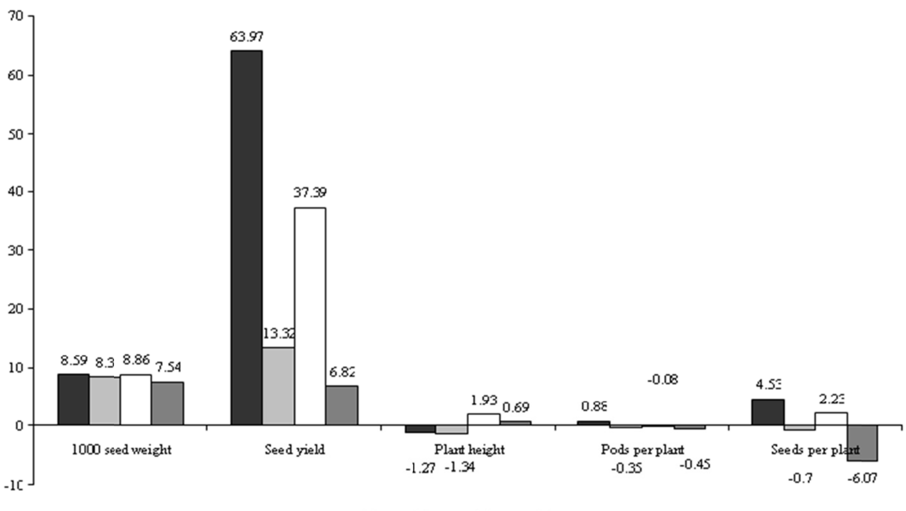

Figure 3. General adaptive ability in the studied traits of vetch varieties

The general adaptive ability (GAA) for plant height varied less ranging from 1.34 (Lorina) to 1.93 (Vilena). Based on the values of specific adaptive ability during different years the stability of cultivars regarding a given trait can be judged. The smaller it is, the more stable parameter is. By this criterion Vilena occupies the best position (36.86) and the highest relative stability (Sgi) of 7.26. Selective value of genotype (SVG) is summarizing index which combines the parameters of stability and productivity. According to data in Table 4, with regards to plant height, Vilena could be referred as selectively valuable genotypes because it was the only variety which reacted nonlinearly (Igi→1) towards environmental conditions.

Vilena and Moldovskaya cultivars showed weak advantage for 1000 seed weight in the analysis of adaptability and stability. They had relatively high GAA (8.86; 7.54), low SAA (7.19; 3.17), good relative stability (Sgi) and low variability of the trait (4.61-3.17). These varieties possess a high selective value.

Negative values of GAA of genotypes were received for pods per plant ranging from 0.88 to -0.08. The positive value though with low importance in Liya cultivar was an indication that the variety was responsive to improving growing conditions. All varieties had low level of variation of the trait and a relatively good stability (Sgi), ranging from 9.63 to 17.48. For this trait a favorite variety, possessing appropriate combination of productivity and stability cannot be selected.

The mathematical analysis of adaptability and stability in regard to seeds per plant indicated that the plants of the varieties Liya and Vilena were characterized by a greater number of seeds per plant and the highest and positive GAA. For the second variety a more favorable SAA (6.76) was established while Vilena occupied last position (19.10). Lorina had with the highest stability (low volatility) (2.61), which reacted nonlinearly (Igi→1) towards environment. By totality of the value of the trait and examined parameters (GAA, SAA, Sgi, SVG) Liya had a certain advantage over other varieties and in best degree combines productivity and stability.

One of the main indicators characterizing the variety is its productivity and seed yield. In terms of the trait specific adaptive ability, evaluated by criterion σ2CACi (which shows the ability of genotype to respond to the specific impact of biotic and abiotic environmental factors), Moldovskaya (118.94) and Vilena (184.77) – stood out. Vilena variety was distinguished as having the best relative stability (Sgi = 11.09) and good interaction of genotype with the environment according to criterion σ(GxE)gi (132.68). Vilena was followed by Liya as determined by selectively valuable (SVG).

3.5 Correlation Analysis for Grain Yield and Statistical Parameters

Figure 4 are shown the dependence relationship between grain yield and parameters GAA, SAA, Igi, Sgi, SVG in both plant species. A statistically high positive correlation of the yield with SAA (r = 0.99), as well as with SVG (r = 0.88) was found in forage pea, a mean correlation with the specific adaptive ability (r = 0.41) and a negative one with the other indicators.

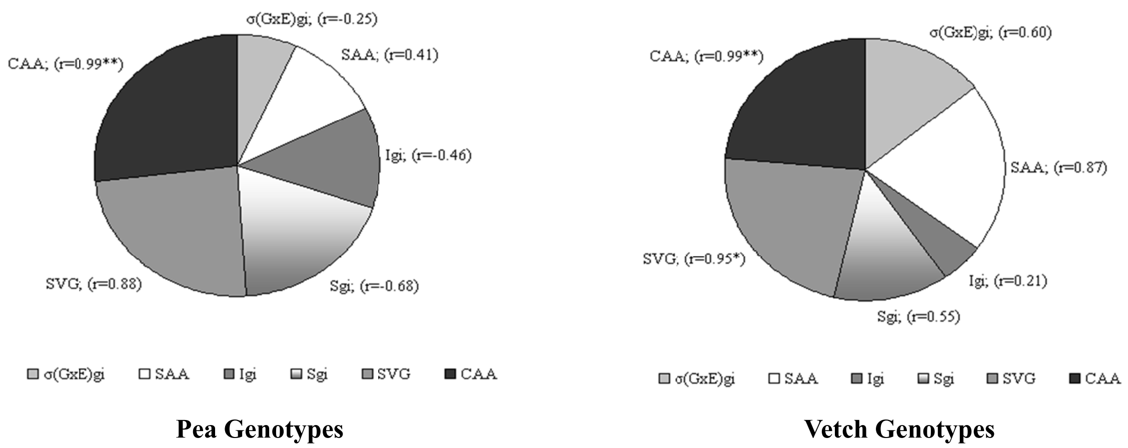

Figure 4. Correlation coefficients between seed yield and parameters of stability and adaptability

Note. *; **: significant at the *$p \leq 0.05$; **$p \leq 0.01$.

Only positive correlations were established in vetch varieties. As was found in the previous dependencies in pea varieties, a certain analogy was observed between grain yield and SAA (r = 0.99**) and SVG (r = 0.95*), that underlined the correctness of the criterion for estimation of genotypes from different species regarding the adaptability to constantly changing environmental conditions.

Also, many researchers have found that genotype-environment interactions are significant for seed yield in different forage crops (Acikgoz et al., 2009; Nizam et al., 2011; Sayar et al., 2013).

Fadeev (2014) reported in his studies that the selective value of genotype is in positive correlation with yield and negative with specific adaptive ability, and for positive correlation between the relative stability and the specific adaptive ability.

The comparison of the individual yield of accessions with average-varietal yield in good years allows potential productivity to be judged. The unfavorable conditions allow adaptability of breeding forms to be established (Lozhkina, 2013).

According to Donskaya (2013) and Abrosimova and Fadeeva (2015) the breeding work in which only high-yielding genotypes are used may lead to the loss of their ecological stability. As the average value of the trait and sensitivity to the environment are relatively independent and they are genetically determined by themselves, the selection work related to ecological stability should be controlled separately. Genotypes possessing coadaptive gene complexes for selection are perspective genotypes.

4. Conclusions

Based on the obtained results the following conclusions can be made:

Varietal-specific reaction of the studied accessions of both species (*Pisum sativum* and *Vicia sativa*) to environmental conditions is established. The conducted assessment of selective value of genotypes gave accurate data for breeding of highly productive forms.

From studied forage pea varieties Glyans was characterized with high adaptive ability and selective value with regards to numbers of seeds, 1000 seed weight and grain yield, Kamerton – regarding plant height and Svit – regarding grain yield.

In terms of general adaptive ability and stability in trait of plant height with the greatest value as a starting material was vetch variety Vilena. Moldovskaya was of interest in terms of 1000 seed weight. Liya is preferred vetch genotype for improving the number of seeds per plant and for selection of new forms in grain yield.

Acknowledgements

The authors thank the Agricultural Academy in Bulgaria for funding the study.

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